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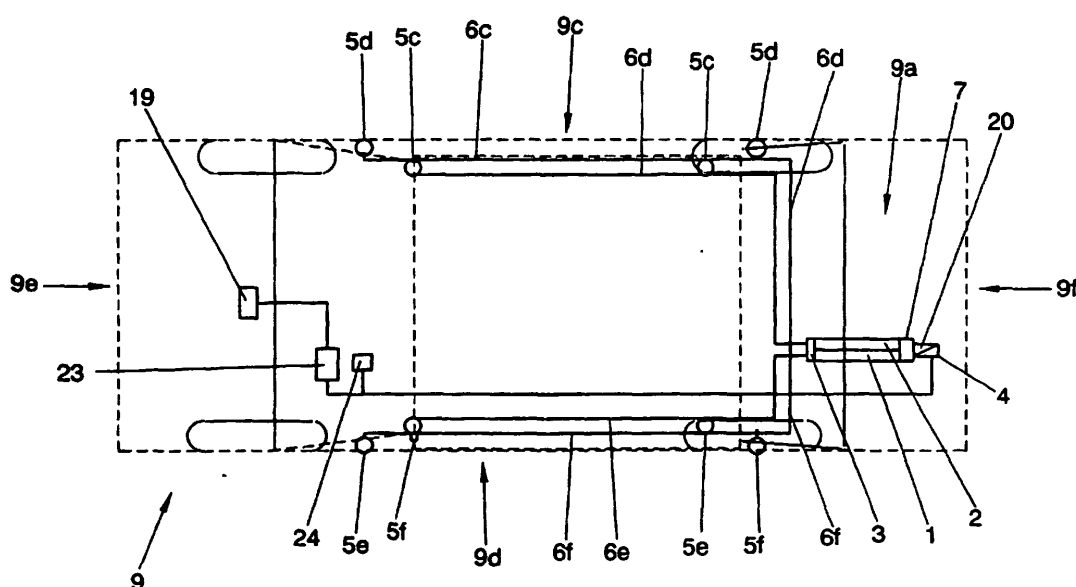
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(54) **INSTALLATION FOR EMERGENCY ILLUMINATION**

(57) Emergency lighting installation with a first reservoir (1) and a second reservoir (2) respectively for a first component (A) and a second component (B) of a liquid chemoluminescent product (C), and connected to product outlets (5) in remote zones via a distributor system (6);  
a mixing system (3) which includes receptor means (4) of an activation signal, for mixing said components (A,B)

in response to the activation signal;  
sealing means (8) which seal the reservoirs (1,2) when the installation is not activated by the activation signal;  
an evacuation system (33) that can be activated by the activation signal and connected to the reservoirs (1,2) for mixing said components (A,B) of the chemoluminescent product (C) and evacuating them via the reservoirs (1,2) and for impelling the luminescent product (C) towards the product outlets (5).



**FIG. 3**

## Description

### TECHNICAL FIELD OF THE INVENTION

**[0001]** The invention comes within the technical sector of safety systems and particularly emergency signaling systems for zones that need to be lit in order to provide greater visibility for parts and/or environs of installations or vehicles. The invention can apply to emergency lighting for zones in industrial facilities such as ports, airports, sports centers, metro and railway stations and tunnels, to buildings such as homes and offices, sports centers and shopping centers, it is particularly useful in the emergency signaling of vehicles and parts thereof, such as ships, aircraft, helicopters, containers, railway and metro trains and, especially, for land vehicles including mobile machinery for public works.

### STATE OF THE ART PRIOR TO THE INVENTION

**[0002]** When an emergency occurs, it is of supreme importance that there should exist adequate visibility for certain zones. When the emergency takes place in a zone of little or no visibility, such as for example in enclosed zones of offices or facilities, or in conditions of low visibility such as for example at night or in the presence of fog or smoke, it becomes necessary to create artificial lighting, whether this be for marking certain places or points, such as indicators for emergency exits or in vehicles that have been involved in accidents, or for producing conditions of visibility in a space such as for example in halls, rooms, washrooms, operating theaters, corridors or stairways, or in places in which an emergency situation has arisen, such as for example in the area around a vehicle that has been involved in an accident or which has broken down.

**[0003]** In the case of a breakdown or, especially, of a traffic accident, involving a vehicle such as for example a land vehicle, the position of the vehicle needs to be signaled in order to warn other drivers of the presence of the stationary vehicle so as to avoid subsequent chain collisions. This signaling is especially important in situations in which the vehicle is stationary in a position that invades the carriageway and/or in atmospheric conditions of low visibility.

**[0004]** In order to provide emergency lighting in buildings or large vehicles such as aircraft, ships and trains, there exist various types of emergency lighting, generally based on lighting devices powered by emergency electrical sources, while, in order to provide emergency signaling land motor vehicles such as cars, trucks, etc., are provided with a manually activated electrical system ("warning") which is triggered by means of simultaneously operating the vehicle's indicators. Nevertheless, this system presents the drawback that it requires the user to press a control in order to activate it, which implies that when the occupants are unconscious or immobilized on account of an accident, the activation of the system be-

comes impossible and so the vehicle remains without any signaling. Moreover, in cases of breakdowns or accidents implying the cutting off of the electrical supply, these systems cannot be activated and, therefore, they do not permit the stationary vehicle to be signaled.

**[0005]** Chemoluminescent products, such as luminol, are also known which permit light to be generated on the basis of a chemical reaction between two or more components when these components come into contact with each other. In devices that produce chemoluminescent lighting, the components are kept stored in separate reservoirs of the device, and they are only mixed when it is wished to generate light. Chemoluminescent products and their components. Known devices of this type are described in, for example, American patents US-4814949, US-4635166, US-4184193, US-4015111, US-3940604, US-3576987, US-4678608, US-3749679, US-3391068, US-3391069, US-3597362.

**[0006]** In particular, American patent US-3940604 describes an emergency lighting system which comprises an array of chemoluminescent devices each one connected to the electrical system. Each device consists of reservoirs in which the components of the chemoluminescent product are kept separate and a system that includes an electromagnet which keeps a spring compressed which in turn is incorporated into a mechanism associated with the reservoirs. In the event of a power cut, the electromagnet loses its capacity to compress the spring, which is therefore released and allows the components of the chemoluminescent products to mix, thereby producing the emergency lighting. The disadvantage of this system is that the chemoluminescent device is activated every time a power cut takes place and it has to be replaced, at least in part, every time after having been activated.

**[0007]** German patent DE-10248787-A1 in turn describes an emergency lighting system for motor vehicles which includes at least one chemoluminescent device and an actuator for activation of the device. The device comes into operation automatically in the event of accident for which a control system is provided which sends an activation signal to the actuator. The control system can be connected to the actuators for an array of chemoluminescent devices. The chemoluminescent devices that are used in the system of German patent application DE-10248787-A1 are automatic devices fitted to various parts of the vehicle, which has the disadvantage that spaces are required in the vehicle body plus the fact that, in the event of one of these devices receiving a blow, it could easily break and be rendered useless.

**[0008]** It was therefore desirable to be able to have an emergency signaling system that did not have the drawbacks of the state of the art. Moreover, it was particularly desirable to be able to have an emergency signaling system for vehicles which would be independent of their electrical power supply from the vehicle battery, which would be able to be activated automatically, with a simple configuration and which would permit clearly visible signaling

of the vehicle in the event of an emergency.

## DESCRIPTION OF THE INVENTION

**[0009]** The present invention relates to a system with the characteristics described above, enumerated by means of an emergency lighting installation, including a first reservoir for a first component of a liquid chemoluminescent product, a second reservoir for a second component of a liquid chemoluminescent product, a mixing system with means for receiving an activation signal that permits the components to be mixed in response to the activation signal in order to obtain the chemoluminescent product; and sealing means which seal the reservoirs when the installation is not activated by the activation signal; where the reservoirs are provided in a distant place of remote zones requiring emergency lighting; the installation furthermore including a distributor system linked to the reservoirs and with product outlets in each remote zone requiring emergency lighting; an evacuation system included in the mixing system, which can be activated by the activation signal and is connected to the reservoirs for evacuating the components of the chemoluminescent product of the reservoirs and in order to impel the luminescent product obtained following the mixing of the components via the distributor system towards the outlets in the vehicle body. The first reservoir preferably includes at least one first evacuation outlet and the second reservoir preferably includes at least one second evacuation outlet which are respectively closed by sealing means when the installation is in the inactive state.

**[0010]** Chemoluminescent products suitable for use in the installation of the present invention are known in themselves, for example, luminol. The first component and the second component can be liquids or the first component can be a liquid while the second component can be solid. Likewise, the first component can be a mixture of solid products which, being dry, do not enter into a chemoluminescent reaction until mixed with the second component which, in this case, is a suitable solvent.

**[0011]** When the present invention is introduced into a vehicle, for example a land vehicle such as a car, or aerial vehicle such as a plane or a helicopter, the reservoirs and the mixing system are arranged in an interior zone of the vehicle while the product outlets are provided in the exterior parts of the vehicle. In this case, the activation signal can be generated by impact detector means that are conventional in themselves, which transmit the activation signal to the receptor means when they detect a greater intensity than the rated impact intensity. These sensor means can form part of the system of the present invention or they can be sensor means already existing in the vehicle, such as for example the sensors for activation of airbags or for pre-tensioning of the safety belts.

In this case, the system can also advisably incorporate means of timing which, when the receptor means receive the activation signal of the impact detector means, delay the activation of the impeller system for a predetermined period of time, such as for example from 5 to 20 seconds, in order, in the event of an accident, to prevent the release of the chemoluminescent product from starting prior to the moment the vehicle comes to a halt.

**[0012]** In accordance with the invention, at least one of the product outlets can be provided with a spray nozzle.

**[0013]** When the installation of the present invention is included in a vehicle, such nozzle or nozzles can be oriented in such a way that the chemoluminescent product is projected onto at least part of the vehicle body which makes some of the surface of the vehicle clearly visible. In addition, it can be oriented in such a way that the chemoluminescent product is projected onto at least part of the environs of the vehicle, which helps not only to signal the place where the vehicle is located but also to light the zone. On the other hand, when the installation of the present invention is included in a construction, such as in a building or a ship, these nozzles can be configured as sprinkler type sprays, which are in themselves known in fire-fighting installations and are conventional in themselves.

**[0014]** Alternatively, or complementarily, at least one of the product outlets can be connected to a product tank that is at least translucent and visible from the outside of the body, at least when it contains the chemoluminescent product.

**[0015]** When these tanks correspond to an installation in a vehicle, these translucent tanks can have the appearance of headlights, rear lights or luminous strips which, when the present invention is applied to a land vehicle, can be incorporated into the side trim and/or into the vehicle fenders, which enables the presence of the vehicle to be made visible and prevents the chemoluminescent liquid from escaping to the environment, while when these tanks correspond to an installation included in a construction, they can be translucent or transparent receptacles.

**[0016]** The evacuation outlets preferably lead to the mixing zone in such a way that, pushed by the impeller system which forms part of the evacuation system, on penetrating to the sealing means and exiting from their respective reservoirs, the components immediately mix, reacting together and forming the chemoluminescent product. The sealing means can be automatic valves which open in response to an increase in pressure from the fluid in the reservoir that they seal, membranes that break when the pressure of the fluid in the reservoir they seal increases, or flaps that open when the pressure of the fluid in the reservoir they seal increases.

**[0017]** In a preferred embodiment of the invention, the impeller system contains a first plunger displaceable in the first reservoir towards the first evacuation outlet, a second plunger displaceable in the second reservoir towards the second evacuation outlet; and means of actu-

ation in order to push the plungers towards the evacuation outlets when the impeller system receives the actuation signal. In this embodiment, the reservoirs are preferably cylindrical though they can also have other configurations. The means of actuation for pushing the plungers can consist of at least one pyrotechnic device, similar to that used for activation of the airbags with which the actuation of the plungers becomes totally independent of the power supply from the vehicle battery. Alternatively, the means of actuation for pushing the plungers can consist of at least one electric motor. In this case, the impeller system can advisably also include a source of electrical supply independent of the vehicle battery.

**[0018]** In another embodiment of the invention, the reservoirs are located in an interior chamber, such as for example in a cylindrical chamber, in a housing such that the first reservoir is located in a first axial space in the cylindrical chamber and the second reservoir is a tubular receptacle made of a flexible plastic material backed by a part of its perimeter onto a recess in the interior wall of the cylindrical chamber. In this embodiment, the impeller system consists of a single plunger that can be displaced in the interior chamber and actuator means for pushing the single plunger towards the first evacuation outlet when the impeller system receives the actuation signal. The single plunger can advisably have a head with a configuration whose diameter becomes narrower in the direction towards the first evacuation outlet, for example a hemispherical or trunco-conical configuration in the case in which the chamber is cylindrical. In this way, as the plunger advances towards the mixing zone, the head of the plunger progressively pushes the first component of the chemoluminescent product in the first reservoir towards the mixing zone and progressively compresses the second reservoir in such a way that the second component of the chemoluminescent product is progressively evacuated from the second reservoir through the second evacuation outlet towards the mixing zone. The second reservoir can have an ogive transverse cross-section and preferably have a transverse extension that is less than half the transverse cross-section of the cylindrical chamber. In this case also, the impeller system can include a pyrotechnic device or at least an electric motor of the type mentioned previously for pushing the single plunger.

**[0019]** In yet another embodiment of the invention, the first evacuation outlet of the first reservoir is connected to an inlet opening of the second reservoir and the mixing zone is located in the second reservoir as a continuation of the inlet opening. In this embodiment, the means of actuation include a first actuation device for pushing the first plunger towards the first evacuation outlet and a second actuation device for pushing the second plunger towards the second evacuation outlet, while the impeller system includes generator means for sequential orders for activation connected to the receptor means. When the receptor means have received an activation signal, the generator means send a first activation order which activates the first actuation device for pushing the first

plunger towards the first evacuation outlet in response to the first order in such a way that the first component of the chemoluminescent product is decanted to the second reservoir via the inlet opening in order to mix the first component with the second component in order to form the chemoluminescent product in the second reservoir. In this way, the two components of the chemoluminescent product are mixed in the second reservoir. Later on, the generator means generate a second activation order, generated when the first component has been at least partially decanted to the second reservoir, which activates the second activation device for pushing the second plunger towards the second evacuation outlet in response to the second order, evacuating chemoluminescent product via the second evacuation outlet.

**[0020]** In an advantageous embodiment of the invention, the mixing zone is a mixing chamber to which the evacuation outlets lead. When this embodiment is applied to a vehicle, the distributor system also includes at least one right main duct which extends along the interior of the vehicle body and links the mixing zone with at least one right product outlet in a right lateral part of the vehicle body, as well as at least one left main duct which extends along the interior of the vehicle body and links the mixing zone with at least one left product outlet in a left lateral part of the vehicle body. In this embodiment, the right main duct can include an upper right distribution duct with at least one upper right product outlet, and a lower right distribution duct with at least one lower right product outlet; while the left main duct can include an upper left distribution duct with at least one upper left product outlet, and a lower left distribution duct with at least one lower left product outlet.

**[0021]** At least one of the upper product outlets can be situated in the upper part of the vehicle while at least one of the lower product outlets can be situated in the lower part of the vehicle. Likewise, the distributor system can include at least one front product outlet linked to one of the ducts. In this case the distributor system preferably includes a right front product outlet and a left front product outlet. The system can in turn include at least one rear product outlet linked to at least one of the ducts and preferably a right rear product outlet and a left rear product outlet.

**[0022]** Each one of the ducts mentioned above can be connected to the mixing chamber via a throat which passes through a wall surrounding the mixing chamber, with each throat being able to be blocked by a blocking pendulum provided in the mixing chamber. The blocking pendulum consists of an upper part, a lower part heavier than the upper part and a tilting shaft between the lower part and the upper part in such a way that, due to gravity, the blocking pendulum is at all times in the vertical position independently of the position that the vehicle is in. The lower part of the blocking pendulum is dimensioned for allowing at least one of the throats to be free when the vehicle is in the horizontal position, and for blocking at least one of the throats when the vehicle is in the over-

turned position. In this way, when the vehicle has overturned onto one of its sides, the throats connected to the outlets of the side on which the vehicle is resting are kept closed by the lower part of the blocking pendulum and the throats connected to the outlets of the upper side are left free, while when the vehicle has overturned onto its roof, the throats connected to the upper outlets become closed by the lower part of the blocking pendulum while the throats connected to the lower outlets are left free.

**[0023]** Alternatively, the distribution ducts can be connected to the mixing chamber via separate electrovalves, provided at the start of the each distribution duct. In order to control these electrovalves and thereby permit a selection to be made of which of the ducts are to open at the moment the chemoluminescent product is expelled, an electrical opening selector for electrovalves is provided, and which is described now. Assuming that one has to control four electrovalves (for two upper distribution ducts and two lower distribution ducts), a polygonal cavity is provided with four sides, each one of which houses an electric switch. Positioned inside the cavity is a ball made of a conducting material which is free to move around. Owing to the action of gravity, the ball will also be in the position of lower equilibrium, actuating the switch to be found there. The switches can be push-buttons or they can respectively consist of two electrical contacts emerging towards the interior of the cavity and separated from each other in which case the ball has sufficient dimensions such that, when it is situated in one of the four sides, it permits contact with the two respective electrical contacts on the side where the ball is to be found due to the effect of gravity. In this way, the electrovalves that have to be opened and those that have to remain closed are selected automatically.

**[0024]** In an embodiment of the installation of the present invention especially applicable to constructions, such as buildings or ships, the distributor system includes an array of pipes via which the evacuation outlets from the reservoirs are connected to the product outlets. In this embodiment the reservoirs are preferably tanks, or chambers of a single tank, provided in an initial zone of the construction and the product outlets are arranged in at least one second zone of construction. The first evacuation outlet can be provided in a lower part of the first tank while the second evacuation outlet can be provided in a lower part of the second tank. In turn, the mixing zone can be a mixing chamber connected to the evacuation outlets of the reservoirs and to the distributor system.

**[0025]** In this embodiment of the installation, the mixing system can include a first pipeline that connects the first evacuation outlet of the first reservoir to the mixing chamber, and a second pipeline that connects the second evacuation outlet of the second reservoir to the mixing chamber. The mixing chamber can be provided in a plane below the evacuation outlets from the reservoirs. The mixing system can include a first electric pump for pumping the first component of the chemoluminescent product

from the first evacuation outlet as far as the mixing chamber, and a second electric pump for pumping the second component of the chemoluminescent product from the second evacuation outlet as far as the mixing chamber.

5 These electric pumps preferably have sufficient power for impelling the chemoluminescent product from the mixing chamber to the product outlets. The mixing system can in turn include, as an alternative or complementarily, a 10 impeller electric pump connected to the mixing chamber and to the distributor system for impelling the chemoluminescent product from the mixing chamber to the product outlets.

**[0026]** In an advantageous embodiment of the invention applied in a construction, the first evacuation outlet 15 of the first reservoir is connected, for example via a decanting duct, to an inlet opening of the second reservoir and the mixing zone is situated in the second reservoir as a continuation of the inlet opening. The inlet opening is preferably provided in the upper part of the second 20 reservoir. In turn, the second evacuation outlet of the first reservoir is connected to the distributor system. In this advantageous embodiment, the installation furthermore includes decanting means for decanting the first component of the chemoluminescent product from the first reservoir to the second reservoir, and generator means for 25 sequential orders for activation connected to the receptor means for sequentially activating the decanting means and the impeller system.

**[0027]** In this embodiment the first reservoir is preferably provided in a plane higher than the second reservoir, 30 the first evacuation outlet is provided in the lower part of the first reservoir, and the decanting means include a decanting electrovalve which opens in response to an opening order generated by the generator means for sequential orders. In this case too, the mixing system can 35 include an electric impeller pump connected to the second evacuation outlet and to the distributor system. Equally, the decanting means can include an electric decanting pump that can be actuated in response to an activator order and connected to the decanting duct for 40 decanting the first component of the chemoluminescent product from the first reservoir to the second reservoir.

**[0028]** The interest of the present invention lies in the extraordinary effectiveness of signaling and lighting provided by the chemoluminescent reagent when employed 45 in this way and in the duration of its light emission which can last for between 8 and 12 hours. Likewise, its particular feature of emitting light without giving off heat is of vital importance since this eliminates a possible source of ignition which could aggravate the situation in the event 50 of an accident.

**[0029]** By virtue of all this, the invention becomes the ideal solution in many different situations and scenarios, where the important factor is the speed of effective and 55 lasting signaling and lighting of the zone of an emergency or of an accident, especially where sources of ignition constitute a major potential threat. Moreover, the known innocuousness of chemoluminescent products means

that there is no fear for people who become splashed by the product, a situation which, moreover, is beneficial since it makes it for the emergency and rescue teams to locate them.

#### BRIEF DESCRIPTION OF THE FIGURES

**[0030]** Described below are some embodiments and aspects of the present invention on the basis of some figures, in which

figure 1 is a schematic front view in perspective view of a motor vehicle in which a first embodiment of the emergency signaling system of the present invention has been fitted;

figure 2 is a schematic sideways view of the vehicle shown in figure 1;

figure 3 is a schematic view in upper plan showing in greater detail the location and interrelation of the various components of the first embodiment of the signaling system shown in figures 1 and 2;

figures 4A - 4D are schematic views of embodiments of the spray nozzles that can be used in the first embodiment of the signaling system shown in figures 1, 2 and 3;

figure 5 is a schematic view in front perspective view of a motor vehicle in which a second embodiment of the emergency signaling system of the present invention has been fitted;

figure 6 is a schematic view in upper plan showing in greater detail the location and interrelation of the various components of the second embodiment of the signaling system shown in figure 6;

figure 7 is a front schematic view of an embodiment of a tank for the components of the chemoluminescent product which can be used in the second embodiment of the signaling system shown in figures 6 and 7;

figure 8 is a schematic view in transverse cross-section of the tank shown in figure 7;

figure 9 is a schematic view in perspective of the tank shown in figure 7;

figure 10 is a schematic view sectioned in upper plan of a first embodiment of a device that includes the reservoirs, the mixing zone and the impeller system;

figure 11 is a front schematic view of the device shown in figure 10;

figure 12 is a schematic view in perspective of the device shown in figure 10;

figure 13 is a schematic view in transverse cross-section of an embodiment of the opening selector for the electrovalves applicable to the device shown in figures 10-12;

figure 14 is a schematic view showing an embodiment of the interconnection of the opening selector shown in figure 12 and the electrovalves of the device shown in figures 10 and 11;

figure 15 is a an embodiment of the interrelation of

the elements shown in figures 10 to 14 with the other elements of the system;

figure 16 is a schematic sideways view of a second embodiment of a device that includes the reservoirs, the mixing zone and the impeller system;

figure 17 is a schematic view in transverse cross-section of the device shown in figure 16;

figure 18 is a front schematic view of the device shown in figure 16;

figures 19A and 19B are schematic views in transverse cross-section showing a first embodiment of some sealing means that can be used in the device shown in figures 10 - 12;

figures 20A and 20B are schematic views in transverse cross-section showing a second embodiment of some sealing means that can be used in the device shown in figures 10 - 12;

figure 21 is a schematic view in transverse cross-section showing a third embodiment of some sealing means that can be used in the device shown in figures 10 - 12;

figure 22 is a schematic view in transverse cross-section of a first embodiment of an impeller system that can be used in the device shown in figures 16 - 18;

figure 23 is a schematic view in transverse cross-section of a second embodiment of an impeller system that can be used in the device shown in figures 16 - 18;

figure 24 is a schematic view in perspective of an application of the system of the present invention to a helicopter;

figure 25 is a schematic view in perspective of an application of the system of the present invention to an interior space of a building;

figure 26 is a schematic view in perspective of examples of locations of the reservoirs of the system of the present invention in a construction, specifically in a building;

figure 27 is a sideways schematic view of examples of locations of the reservoirs of the system of the present invention in a construction, specifically in a ship;

figure 28 is a schematic view in upper plan of an application of the system of the present invention in a construction;

figure 29 is a schematic view in side elevation of a first arrangement of the reservoirs of the system of the present invention in a construction;

figure 30 is a schematic view in side elevation of a second arrangement of the reservoirs of the system of the present invention in a construction;

figure 31 is a schematic view in side elevation of a third arrangement of the reservoirs of the system of the present invention in a construction;

figure 32 is a schematic view in side elevation of a fourth arrangement of the reservoirs of the system of the present invention in a construction;

figure 33 is a schematic view in side elevation of a fourth arrangement of the reservoirs of the system of the present invention in a construction;  
figure 34 is a schematic view in side elevation of a fifth arrangement of the reservoirs of the system of the present invention in a construction;  
figure 35 is a schematic view in side elevation of a sixth arrangement of the reservoirs of the system of the present invention in a construction;  
figure 36 is a schematic view of an embodiment of the activation circuit for the arrangement shown in figure 32 and 33;  
figure 37 is a schematic view of an embodiment of the activation circuit for the arrangement shown in figure 34 and 35;

**[0031]** Appearing in these figures are various elements identified by the following numerical references:

A	first component of the chemoluminescent product	20	9c	right side part
B	second component of the chemoluminescent product		9d	left side part
C	liquid chemoluminescent product		9e	front part
1	first reservoir	25	9f	rear part
1a	first evacuation outlet		10	means of actuation
2	second reservoir		10a	first means of actuation
2a	second evacuation outlet		10b	second means of actuation
2b	inlet opening		11	pyrotechnic device
3	mixing system	30	12	electric motor
3a	mixing zone		12a	threaded shaft
3b	throat		13	housing
3c	wall		13a	interior chamber in the housing
3d	mixing chamber		13b	first axial space in the interior chamber
3e	first duct		13c	inlet in the wall of the interior chamber
3f	second duct	35	13d	front wall of the interior chamber
4	receptor means		14	tubular receptacle
5	product outlets		14a	perimeter
5a	right product outlet		15	actuator means
5b	left product outlet	40	15a	tank of generator material for propellant gas
5c	upper right product outlet		15b	ignition fuse
5d	lower right product outlet		15c	electrical connection
5e	upper left product outlet		15d	interior cavity in the plunger
5f	lower left product outlet		15e	outlet for propellant gas
5g	front product outlet	45	16	spray nozzle
5h	rear product outlet		17	product tank
6	distributor system		17a	front part of the tank
6a	right main duct		17b	rear part of the tank
6b	left main duct		17c	interior space of the tank
6c	upper right distribution duct	50	17d	filling inlet
6d	lower right distribution duct		18	blocking pendulum
6e	upper left distribution duct		18a	upper part
6f	lower left distribution duct		18b	lower part
6g	pipes		18c	tilting shaft
6h	decanting duct	55	19	impact detector means
7	impeller system		20	timer means
7a	first plunger		21	opening selector for electrovalves
7b	second plunger		21 a	interior hole
			21 b	ball made of conductor material
			21 c	electrical contacts
			7c	single plunger
			7d	head of single plunger
			7e	first electric pump
			7f	second electric pump
5			7g	electric impeller pump
			8	sealing means
			8a	automatic valve
			8b	membrane
			8c	flap
10			8d	spring
			8e	widening
			8f	hinge
			8g	retaining flange
			8h	decanting electrovalve
15			8i	cutoff electrovalve
			8j	plug
			9	vehicle
			9a	interior zone
			9b	exterior part
			9c	right side part
			9d	left side part
			9e	front part
			9f	rear part
			10	means of actuation
			10a	first means of actuation
			10b	second means of actuation
			11	pyrotechnic device
			12	electric motor
			12a	threaded shaft
			13	housing
			13a	interior chamber in the housing
			13b	first axial space in the interior chamber
			13c	inlet in the wall of the interior chamber
			13d	front wall of the interior chamber
			14	tubular receptacle
			14a	perimeter
			15	actuator means
			15a	tank of generator material for propellant gas
			15b	ignition fuse
			15c	electrical connection
			15d	interior cavity in the plunger
			15e	outlet for propellant gas
			16	spray nozzle
			17	product tank
			17a	front part of the tank
			17b	rear part of the tank
			17c	interior space of the tank
			17d	filling inlet
			18	blocking pendulum
			18a	upper part
			18b	lower part
			18c	tilting shaft
			19	impact detector means
			20	timer means
			21	opening selector for electrovalves
			21 a	interior hole
			21 b	ball made of conductor material
			21 c	electrical contacts

21d	electrovalve - selector electrical connection
21 e	electrical power - selector connection
22	electrovalve
23	airbag triggering device
24	actuation control
25	auxiliary battery
26	control device
27	construction
27a	first zone of the construction
27b	second zone of the construction
28	corridor
28a	right wall of corridor
28b	left wall of corridor
28c	roof of corridor
29	generator means for sequential orders for activation
30	electric pump for decanting
31	building
32	ship
33	evacuation system
34	electric valves for distribution

#### MODES OF EMBODYING THE INVENTION

**[0032]** In the first embodiment of the system of the invention shown in figures 1 to 3, the system is applied to an automobile vehicle 9 and includes a housing 13 in which are provided some reservoirs 1,2 each of which contains one of the components of a chemoluminescent product, an impeller system 7 for evacuating the components towards a mixing system 3, along with some receptor means 4 for activation signals for the impeller system 7, and a timer 20 which delays the activation of the impeller system when the receptor means 4 have received such signal. The activation signal can come from impact detector means 19, conventional in themselves, and which can be the same as those used for activation of the triggering device 23 for the airbags of the vehicle. Alternatively, the signal can come from an actuation control 24, which can be actuated manually by the driver or a passenger, for example. The housing 13 is provided in an interior zone 9a of the vehicle, specifically in the rear part 9f in the zone of the trunk.

**[0033]** The mixer system 3 is connected to an upper right distribution duct 6c with upper product outlets 5c in the upper part of the right side part 9c of the vehicle 9, along with a lower right distribution duct 6d with lower product outlets 5d in the lower part of the right side part 9c of the vehicle 9. In turn, the mixer system is also connected to an upper left distribution duct 6e with upper product outlets 5e in the upper part of the left side part 9d of the vehicle, along with a lower left distribution duct 6f with lower product outlets 5f in the lower part of the left side part 9d of the vehicle 9. The product outlets 5c, 5d, 5e, 5f are situated in the external part of the body of the vehicle 9.

**[0034]** The product outlets 5c, 5d, 5e, 5f can be configured in the manner of spray nozzles 16 in accordance

with that shown in figures 4A - 4D.

**[0035]** So, figures 4A and 4B show a first embodiment of a spray nozzle 16 arranged in a product outlet 5 provided in the exterior part 9b of the vehicle body. This nozzle 16, conventional in itself, expels the chemoluminescent product C downwards, due to which it is especially suited for the upper product outlets owing to the fact that it projects the chemoluminescent product in such a way that it can also sprinkle the exterior part 9b of the vehicle.

**[0036]** In the second embodiment of the spray nozzle 16, conventional in itself, it sprays the chemoluminescent product C upwards onto the side part of the vehicle. Consequently, this embodiment of the spray nozzle 16 is especially suited for the lower product outlets given that, apart from spraying the exterior part 9b when the vehicle is stationary in the "normal" position, it also sprays the exterior part 9b when the vehicle has overturned and it upside down.

**[0037]** Figures 5 and 6 show a second embodiment of the invention, also applied to an automobile vehicle, in which the reservoirs, the impeller system, the mixing system and the receptor means of activation signals for the impeller system, and the timer, are the same as in the first embodiment shown in figures 1 to 3 provided in the housing 13, but in which the mixing system 3 is connected to a right main duct 6a which extends along the interior of the vehicle 9 and which includes an array of right product outlets 5a in the external left side part 9c of the vehicle 9, along with an external left main duct 6b which extends along the interior of the vehicle 9 with an array of left product outlets 5b in the external left side part 9d of the vehicle 9. The right main duct 6a and the left main duct are also connected to separate front product outlets 5g and to separate rear product outlets. In turn, the product outlets 5a, 5b lead to respective translucent product tanks 17 introduced into the side and front trim of the automobile vehicle. An example of those tanks can be seen in figures 7 to 9. In the embodiment shown in those figures, the tank 17 is a piece of trim with an interior space 17c defined between a rear part 17b fixed to the external part of the vehicle body and a transparent or translucent front part 17a with a domed transverse cross-section, joined to the rear part 17b. Leading to the interior space 17c is at least one of the product outlets 5 via a filling inlet 17d provided in the rear part 17b of the tank 17 which is in turn fixed to the external part of the vehicle body.

**[0038]** The embodiment of the device that includes the reservoirs 1,2, the mixing system 3 and the impeller system 7 shown in figures 10, 11 and 12 is applicable to the installation shown in figures 1 to 3. It can be seen that in this embodiment, the device includes a first reservoir 1 for the first component A of the liquid chemoluminescent product C and a second reservoir 2 for the second component B of the chemoluminescent product C. The mixing system for mixing those components A, B in response to the activation signal for obtaining the chemoluminescent product C includes a mixing zone 3a in the form of a



chamber in which said components A,B are mixed. The reservoirs 1,2 include separate evacuation outlets 1a,2a, respectively closed by sealing means 8 when the installation is in the inactive state shown in figures 10 to 12.

**[0039]** The impeller system of the device includes means of actuation 10 for pushing a first plunger 7a in the first reservoir 1 towards the first evacuation outlet 1a and for pushing a second plunger 7b in the second reservoir 2 towards the second evacuation outlet 2a, when the impeller system 7 receives the actuation signal. The means of actuation include a first actuation device 10a for pushing the first plunger 7a and a second actuation device 10b for pushing the second plunger 7b. Each actuation device 10a,10b includes an electric motor 12 connected to a threaded shaft 12a which screws into the plunger 7a,7b to which it is associated. Given that the plungers 7a,7b are arranged in such a way that they rotate around in the respective reservoirs, the rotation of the shaft 12a actuated by the motor 12 causes the displacement of the plunger 7a,7b towards the evacuation outlets 1a,2a which, in turn, lead to the mixing zone 3a. In this way, when the motors 12 are activated, they simultaneously push both plungers 7a,7b towards the evacuation outlets 1a,2a and, after opening the sealing means 8, they cause the components A,B to penetrate in the mixing zone 3a where the chemoluminescent product C is formed. The front wall 3c of the mixing chamber 3a is provided with four throats 3b respectively connected to the upper right distribution duct 6c, the lower right distribution duct 6d, the upper left distribution duct 6e and the lower left distribution duct 6f, via separate electrovalves 22.

**[0040]** In accordance with that shown in figures 13 to 15, these electrovalves 22 are connected to an opening selector 21 for the electrovalves 22, with the aim of permitting a selection to be made of which of the distribution ducts 6c,6d,6e,6f are opened at the moment of expelling the chemoluminescent product C. The selector 21 includes an interior hole 21a of quadrangular transverse cross-section whose corners are respectively positioned in the upper part, the lower part, the right part and the left part of the hole 21a. Housed inside the interior hole 21a is a ball 21b made of a conducting material and which can be displaced inside that interior hole 21a. Provided in each of the side interior walls of the interior hole 21a is an electric switch 21c which is in turn connected via an electrical connection 21d to one of the electrovalves 22. Owing to the action of gravity, the ball 21b is at all times in the position of lower equilibrium, actuating the switches present there. In the embodiment shown in figures 13 to 15, the switches are push-buttons which, when the ball rests on two of them that are in the lower position, this prevents the electrovalves 22 to which they are connected from becoming opened, so the chemoluminescent product enters into the distribution ducts in which the valves are to be found that have been closed by the action of these switches. In the case of the figures 13 to 15, the closed electrovalves 22 are those to be found in

the lower distribution ducts 6d,6f. In this way, when the vehicle has overturned onto one of its sides, the electrovalves 22 connected to the outlets of the side on which the vehicle is resting stay closed owing to the displacement of the ball 21b and the consequent actuation of the corresponding switches 21c, while the electrovalves 22 connected to the distribution ducts for the side that remains free stay open, while when the vehicle is turned over onto its roof the electrovalves 22 connected to the upper distribution ducts 6c,6e stay closed owing to the displacement of the ball 21b and the consequent actuation of the corresponding switches 21c while the lower distribution ducts 6d,6f stay open. In this way, the chemoluminescent product only exits through those outlets that are in elevated positions and they are therefore clearly visible for the effects of being marked with the chemoluminescent product.

**[0041]** A second embodiment of the device that includes the reservoirs 1,2 which would also be directly applicable to the installation shown in figures 1 to 3 is shown in figures 16 to 18. In this second embodiment of the device, the reservoirs 1,2 are located in an interior chamber 13a of the housing 13, the first reservoir 1 being a first axial space 13b in the interior chamber 13a and the second reservoir 2 being a tubular receptacle 14 of the tubular receptacle made of a flexible plastic material backed by a part of its perimeter 14a onto a recess 13c in the interior wall of the interior chamber 13a. The impeller system in turn consists of a single plunger 7c that can be displaced in the interior chamber 13a and actuator means 15 for pushing the single plunger 7c towards the first evacuation outlet 1a when the impeller system 7 receives the actuation signal. The said single plunger 7c has a head 7d with a configuration of transverse cross-section that is complementary to the transverse cross-section of the interior chamber 13a, and its diameter becomes narrower in the direction towards the first evacuation outlet 1a. In this way, as the single plunger 7c advances towards the mixing zone, the head 7d of the single plunger 7c progressively pushes the first component A of the chemoluminescent product C present in the first reservoir 1 towards the mixing zone 3a in which it enters after breaking the sealing membrane 8b provided in the first evacuation outlet 1a, and likewise progressively compresses the second reservoir 2 in such a way that the second component B of the chemoluminescent product C, after breaking the sealing membrane 8b provided in the second evacuation outlet 2a, is progressively evacuated from the second reservoir 2 towards the mixing zone 3a. In the embodiment shown in figures 16 to 18, the first reservoir 1 has a circular transverse cross-section and the second reservoir 2 has an ogive transverse cross-section that is less than half the transverse cross-section of the interior chamber 13a. It can also be seen in the embodiment of the device shown in figures 16 to 18 that each distribution duct 6c,6d,6e,6f is connected to the mixing zone 3a via separate throats 3b which transverse the front wall of the housing 13, each throat 3b

being able to be blocked by a blocking pendulum 18 provided in the mixing chamber 3a. This blocking pendulum 18 includes an upper part 18a, a lower part 18b heavier than the upper part 18a and a tilting shaft 18c between the lower part 18b and the upper part 18a. The lower part 18b of the blocking pendulum 18 is dimensioned in such a way that the throats 3b connected to the upper distribution ducts 6c, 6e are left open and the lower distribution ducts 6d, 6f are closed when the vehicle is in the horizontal position, while when the vehicle is in the overturned position it blocks those throats connected to the distribution ducts corresponding to the side on which the vehicle rests, or when the vehicle has overturned onto its roof it closes the throats 3b connected to the upper distribution outlets 6c, 6e and leaves the lower distribution outlets 6d, 6f open. In this way too, the chemoluminescent product only exits through those outlets that are in elevated positions and therefore clearly visible for the purposes of its marking with the chemoluminescent product.

**[0042]** Figures 19A and 19B illustrate an embodiment of the sealing means 8 of the first evacuation outlet 1a in the wall 13d of the interior chamber 13 corresponding to the first reservoir 1 of the device shown in figures 10 - 12. Specifically, the sealing means consist of an automatic valve 8a containing a plug 8j of truncated-conical cross-section and arranged in a widening 8e of the evacuation outlet 1a, aided by a helical spring 8d. When, as shown in figure 19B, the means of actuation push the plunger towards the evacuation outlet 1a, the pressure exerted by the first component A of the chemoluminescent product pushes the plug 1j towards the front, against the force of the spring 8d, in such a way that the first component A flows through the widening 8e toward and through the evacuation outlet 1a. When the first component A ceases to exert sufficient pressure on the plug, the plug 1j returns to its sealed position shown in figure 19A. Obviously, the automatic valve 8a shown in the figures 19A and 19B can also be applied by analogy to the second evacuation outlet 2a of the second reservoir shown in figures 10 - 12.

**[0043]** Figures 20A and 20B illustrate another embodiment of the sealing means 8 of the second evacuation outlet 2a in the front wall 13d of the interior chamber 13 corresponding to the first reservoir 1 of the device shown in figures 10 - 12, though it would also by analogy be applicable to the first evacuation outlet 1a of the device shown in figure 16. As shown in figure 20A, in this embodiment the sealing means includes a breakable membrane 8b provided in the evacuation outlet 2a in such a way that it seals said outlet 2a. When, as shown in figure 20B, the means of actuation push the plunger towards the evacuation outlet 2a, the pressure exerted by the second component B of the chemoluminescent product breaks the membrane 8b, in such a way that the second component B can flow freely through the evacuation outlet 1a. Obviously, the membrane 8b shown in the figures 20A and 20B can also be applied by analogy to the first evacuation outlet 1a of the first reservoir shown in figures

10 - 12.

**[0044]** Figure 21 shows another embodiment of the sealing means 8 for the first and/or second evacuation outlet 1a, 2a in the front wall 13d of the reservoirs 1, 2 of the device shown in figure 10 - 12. In this embodiment, the sealing means consist of a flap 8c attached to the front wall 13d by means of a hinge 8f and retained in its opposite part by a retention flange 8g. When the means of actuation are pushing the corresponding plunger towards the evacuation outlet 1a, 2a the pressure exerted by the component A, B of the chemoluminescent product overcomes and breaks the retaining force of the flange 8g such that, as marked by the line of dashes, the flap 8c opens and the component A, B can flow freely through the evacuation outlet 1a, 2a.

**[0045]** Figures 22 and 23 show two embodiments of two actuator means 15 of the single plunger 7c corresponding to the device shown in figure 16.

**[0046]** In the embodiment shown in figure 22, the actuator means 15 include a pyrotechnic device 11 for pushing the single plunger 7c. The pyrotechnic device 11, conventional in itself, includes an array of tanks 15a of generator material for a propellant gas provided in an internal cavity linked to an interior cavity 15d in the rear part of the single plunger 7c. Provided between the tanks 15a is an ignition fuse 15b connected to an electrical connection 15c. When the fuse 15b receives an electrical impulse it becomes activated and causes, also in a way conventional in itself, the generator material of the propellant gas to react explosively releasing the propellant gas which exits suddenly and with great force through the outlet 15e pushing the single plunger and, therefore, the components of the chemoluminescent product towards the evacuation outlets.

**[0047]** In the embodiment of the actuator means shown in figure 23, they consist of an electric motor 12 connected to a threaded shaft 12a which screws into the plunger 7c. The motor 12 is connected to an electrical power supply source such as a battery for example (not shown in figure 23) by means of an electrical connection 15c in such a way that, when the motor 12 is connected to the supply source, the rotation of the motor causes the threaded shaft 12a to rotate. Since the plunger 7c is arranged in such a way that it cannot turn inside the housing 13, the rotation of the shaft 12a driven by the motor 12 causes the plunger 7c to be displaced towards the evacuation outlets and, therefore, the evacuation of the components of the chemoluminescent product towards the product outlets.

**[0048]** Figure 24 shows an embodiment in which an installation according to the present invention is applied to an aircraft, particularly to a helicopter. In this embodiment, the housing 13 containing the reservoirs and the impeller system is provided in the upper part of the helicopter. The impeller system is connected to the product outlets fitted with spray nozzles 16 respectively arranged in the upper right part and in the upper left part via a right main duct 6a and a left main duct 6b.

**[0049]** Figure 25 illustrates an embodiment of the installation applied to the interior of a construction 27, such as for example a building or a ship, and more specifically in a corridor 28. It can be seen that the housing 13 contains the reservoirs and the impeller system and is provided in a gap in the right wall 28a of the corridor 28 and connected to the product outlets 5 which are fitted with spray nozzles 16 by means of the distribution system 6. Evidently, the product outlets 5 could also be provided in the left wall 28b or in the ceiling 28c of the corridor 28. The activation of the installation can be automatic by means of a detector (not shown in figure 25) which activates the installation in the absence of light for more than a defined period of time, or by means of a manual actuation control 24 which can be operated by a person who is in the corridor 28.

**[0050]** Figure 26 shows possible locations of the device with the reservoirs in a building 31. So, the reservoirs 1,2, 1',2' can be arranged in an upper zone 27a of the building and/or in a lower zone 27a'. Analogously, in figure 27 in which the installation of the present invention is applied to a ship 32, the reservoirs 1,2, 1',2' can be arranged in an upper zone 27a of the ship and/or in a lower zone 27a' of the ship.

**[0051]** Figure 28 illustrates an embodiment of the installation applicable to constructions, such as for example the building 31 of figure 26 or to the ship 32 of figure 27. In the embodiment that is shown, the reservoirs 1,2 are provided in a first zone 27a of the construction while the product outlets 5 are housed in a second zone of the construction. The reservoirs 1,2 are connected to the product outlets 5 via the distributor system 6 consisting of pipes 6h. Provided in the branches of the distributor system 6 are some electrical distribution valves 34, controllable by means of a central control system (not shown in figure 28), by means of which the chemoluminescent product can be led to those areas where the emergency lighting is really needed.

**[0052]** Figures 29 to 35 illustrate various possible embodiments of how the reservoirs can be arranged in the embodiment of the installation shown in figure 28.

**[0053]** So, in the embodiment shown in figure 29, the reservoirs 1,2 are separate tanks whose lower parts contain respective evacuation outlets 1a,2a which are linked to the mixing chamber 3d provided in a plane lower than the plane of the evacuation outlets 1a,2a via ducts in which separate cutoff valves 8i are inserted. The mixing chamber 3d is in turn connected to various product outlets (see figure 28) via the pipe 6g whose initial section includes an electric impeller pump 7g with additional cutoff electrovalves 8i inserted in its intake and outlet.

**[0054]** The embodiment shown in figure 30 is similar to that of figure 29, with the exception that the duct which links the first evacuation outlet 1a with the mixing chamber 3d is fitted with a first electric pump 7e and in which the duct which links the second evacuation outlet 2a with the mixing chamber 3d is fitted with a second electric pump 7f.

**[0055]** The embodiment shown in figure 31 is differentiated from the embodiment shown in figure 29 solely in that the reservoirs 1,2 are provided in the housing 13.

**[0056]** In figure 32, another embodiment can be seen in which the evacuation outlet 1a of the first tank 1 is connected via a decanting duct 6h to an inlet opening 2b in the upper part of the second reservoir 2, in such a way that the mixing zone 3a is located in the second reservoir 2 as a continuation of the inlet opening 2b. The decanting duct 8h is provided with an electrovalve 8i and an electric decanting pump 30, such that, when the installation is activated, the pump 30 pumps the first component of the chemoluminescent product from the first reservoir 1 to the interior of the second reservoir 2 in which the second component of the chemoluminescent is found, so that the two components mix and react so as to form the chemoluminescent product, which is then evacuated through the second evacuation outlet 2a of the second reservoir when the impeller electric pump 7g is started up (after having opened the electrovalves 8i',8i''), which impels the chemoluminescent product towards the product outlets.

**[0057]** The embodiment shown in figure 33 is differentiated from the embodiment of figure 32 only in that it lacks the impeller electric pump 7g, so that the chemoluminescent product reaches the product outlets by flowing under gravity through the decanting duct 6h. This embodiment is feasible when the reservoirs 1,2 are arranged in an upper zone of the construction, as are for example the zones 27a in the constructions shown in figures 26 and 27.

**[0058]** The embodiment shown in figure 34 is differentiated from that of figure 33 in that the evacuation outlet 1a of the first reservoir 1 is provided in a plane higher than the inlet 2b of the second reservoir 2, in such a way that the impeller electric pump 7g can be dispensed with for decanting the first component of the chemoluminescent product to the second reservoir via the decanting duct 6h.

**[0059]** Finally, the embodiment shown in figure 35 is differentiated from the embodiment of figure 34 only in that the duct connected to the evacuation outlet 2a of the second reservoir is connected to an impeller electric pump 7g in such a way that the embodiment of figure 35 can be used in installations in which the reservoirs 1,2 are provided in zones with equal or lower planes than at least part of the product outlets, such as for example the zones 27a' shown in figures 26 and 27.

**[0060]** In the embodiments shown in figures 32 to 35, it is clear that, before the second evacuation outlet 2a can be opened, the chemoluminescent product must have been formed completely by reaction of the first component decanted into the second reservoir with the second component, for which these components have to be allowed to be in contact with each other for a sufficient period of time so that this reaction can take place.

**[0061]** Figure 36 schematically illustrates an activation circuit for the devices shown in figures 32 and 33, with

the parts that are applicable just to figure 32 being shown in dotted lines. Interconnected between the receptor means for activation signals 4 are some generator means for sequential orders for activation 29 which are in turn connected to the electrovalves 8i arranged in the decanting duct 6h, to the first electrovalve 8i' connected to the outlet 2a of the second reservoir 2 and, as shown with the line of dots for the case of the embodiment of figure 32, to the second electrovalve 8i'' and to the impeller electric pump 7g.

**[0062]** When the receptor means 4 receive the activation signal for the installation via the electrical connection 15c, the generator means for sequential orders for activation 29 emit an opening order to the first electrovalves 8i arranged in the decanting duct 6h, and then a second activation order for the pump 30, so that the first component of the chemoluminescent product can be decanted to the second reservoir 2. The two components are kept in the second reservoir for a sufficient length of time for the components to react and form the chemoluminescent product. In order to permit a sufficient duration for the reaction, the generator means 29 do not generate an opening order to the electrovalve 8i' (and in the case of the embodiment of figure 32, an opening order to the electrovalve 8i'' and an activation order to the pump 7g) connected to the outlet 2a of the second reservoir 2 until a predetermined length of time has passed. Only after that period of time which guarantees the formation of the chemoluminescent product do the generator means 29 generate those orders so as to permit the evacuation of the chemoluminescent product formed in the second reservoir 2.

**[0063]** The figure 37 schematically illustrates an activation circuit for the devices shown in figures 34 and 35, with the parts that are applicable just to figure 35 being shown in dotted lines. For these embodiments the generator means for sequential orders for activation 29 are connected to the electrovalve 8i arranged in the decanting duct 6h, to the first electrovalve 8i' connected to the outlet 2a of the second reservoir 2 and, as shown with the line of dots for the case of the embodiment of figure 35, to the second electrovalve 8i'' and to the impeller electric pump 7g.

**[0064]** When the receptor means 4 receive the activation signal for the installation via the electrical connection 15c, the generator means for sequential orders for activation 29 emit an opening order to the electrovalve 8i arranged in the decanting duct 6h so that the first component of the chemoluminescent product can be decanted to the second reservoir 2. The two components are kept in the second reservoir for a sufficient length of time for the components to react and form the chemoluminescent product. In order to permit a sufficient duration for the reaction, the generator means 29 incorporate a timer which does not generate an opening order to the electrovalve 8i' (and in the case of the embodiment of figure 35, an opening order to the electrovalve 8i'' and an activation order to the pump 7g) connected to the outlet 2a

of the second reservoir 2 until a predetermined length of time has passed. Only after that length of time which guarantees the formation of the chemoluminescent product do the generator means generate 29 those orders so as to permit the evacuation of the chemoluminescent product formed in the second reservoir 2.

## Claims

1. Emergency lighting installation, which consists of at least one first reservoir (1) for a first component (A) of a liquid chemoluminescent product (C), at least one second reservoir (2) for a second component (B) of a liquid chemoluminescent product (C), a mixing system (3) which includes receptor means (4) of an activation signal, for mixing said components (A,B) in response to the activation signal in order to obtain the chemoluminescent product (C), along with a mixing zone (3a) in which said components (A,B) are mixed, sealing means (8) which seal the reservoirs (1,2) when the installation is not activated by the activation signal;  
**characterized in that** the reservoirs (1,2) are connected to product outlets (5) in remote zones via a distributor system (6); the mixing system (3) furthermore includes an evacuation system (33) that can be activated by the activation signal and connected to the reservoirs (1,2) for mixing said components (A,B) of the chemoluminescent product (C) and evacuating them from the reservoirs (1,2) in order to impel the chemoluminescent product (C) obtained following the mixing of said components (A,B) via the distributor system (6) towards the product outlets (5).
2. Installation according to claim 1, **characterized in that** the first reservoir (1) includes at least one first evacuation outlet (1 a) and the second reservoir (2) includes at least one second evacuation outlet (2a), the evacuation outlets (1 a,2a) being respectively closed by the sealing means (8) when the installation is in the inactive state.
3. Installation according to claim 2, **characterized in that** the evacuation system (33) includes an impeller system (7) which contains a first plunger (7a) displaceable in the first reservoir (1) towards the first evacuation outlet (1a), a second plunger (7b) displaceable in the second reservoir (2) towards the second evacuation outlet (2a) and means of actuation (10) in order to push the plungers (7a,7b) towards the evacuation outlets (1a,2a) when the impeller system (7) receives the actuation signal.
4. Installation according to claim 3, **characterized in**

that the means of actuation (10) consist of at least one pyrotechnic device (11) for pushing at least one of said plungers (7a,7b).

5. Installation according to claim 3 or 4, **characterized in that** the means of actuation (10) consist of at least one electric motor (12) for pushing at least one of said plungers (7a,7b).

6. Installation according to claim 4 or 5, **characterized in that** the means of actuation (10) simultaneously push both plungers (7a,7b) towards the evacuation outlets (1 a,2a) and **in that** the evacuation outlets (1 a,2a) lead to the mixing zone (3a).

7. Installation according to claim 2, **characterized in that** the evacuation system (33) includes an impeller system (7) and **in that** the reservoirs (1,2) are located in an interior chamber (13a) of a housing (13);  
the first reservoir (1) is a first axial space (13b) in the interior chamber (13a);  
the second reservoir (2) is a tubular receptacle (14) made of a flexible plastic material backed by a part of its perimeter (14a) onto a recess (13c) in the interior wall of the interior chamber (13a);  
the impeller system (7) consists of a single plunger (7c) that can be displaced in the interior chamber (13a) and actuator means (15) for pushing the single plunger (7c) towards the first evacuation outlet (1a) when the impeller system (7) receives the actuation signal;  
the single plunger (7c) has a head (7d) with a configuration of transverse cross-section that is complementary to the transverse cross-section of the interior chamber (13a) and whose diameter narrows in direction towards the first evacuation outlet (1 a), in such a way that as the single plunger (7c) advances towards the mixing zone, the head (7d) of the single plunger (7c) progressively pushes the first component (A) of the chemoluminescent product (C) present in the first reservoir (1) towards the mixing zone (3a) and progressively compresses the second reservoir (2) in such a way that the second component (B) of the chemoluminescent product (C) is progressively evacuated from the second reservoir (2) towards the mixing zone (3a).

8. Installation according to claim 7, **characterized in that** the first reservoir (1) has a circular transverse cross-section and the second reservoir (2) has an ogive transverse cross-section.

9. Installation according to claim 7 or 8, **characterized in that** the second reservoir (2) has a transverse extension that is less than half the transverse cross-section of the interior chamber (13a).

10. Installation according to any of claims 7 to 9, **characterized in that** the actuator means (15) of the impeller system (7) include a pyrotechnic device (11) for pushing the single plunger (7c).

11. Installation according to any of claims 7 to 10, **characterized in that** the actuator means (15) include at least one electric motor (12) for pushing the single plunger (7c).

12. Installation according to claim 3, 4 or 5, **characterized in that** the first evacuation outlet (1a) of the first reservoir (1) is connected to an inlet opening (2b) of the second reservoir (2);  
the mixing zone (3a) is located in the second reservoir (2) as a continuation of the inlet opening (2b);  
the means of actuation (10) include a first actuation device (10a) for pushing the first plunger (7a) towards the first evacuation outlet (1a) and a second actuation device (10b) for pushing the second plunger (7a) towards the second evacuation outlet (2a);  
the impeller system (7) includes generator means (29) for sequential orders for activation connected to the receptor means (4);  
when the receptor means (4) have received an activation signal, the generator means (29) generate a first activation order which activates the first actuation device (10a) for pushing the first plunger (7a) towards the first evacuation outlet (1 a) in response to the first order in such a way that the first component (A) of the chemoluminescent product (C) is decanted to the second reservoir (2) via the inlet opening (2b) in order to mix the first component (A) with the second component (B) in order to form the chemoluminescent product (C) in the second reservoir (2), and a second activation order, generated when the first component (A) has been at least partially decanted to the second reservoir (2), which activates the second activation device (10b) for pushing the second plunger (7b) towards the second evacuation outlet (2a) in response to the second order, evacuating chemoluminescent product (C) via the second evacuation outlet (2a).

13. Installation according to any of the preceding claims, **characterized in that** the reservoirs (1,2) and the mixing system (3) are provided in an interior zone (9a) of a vehicle (9) and **in that** the product outlets (5) are provided in the exterior parts (9b) of the vehicle (9).

14. Installation according to any of the preceding claims, **characterized in that** the reservoirs (1,2) and the mixing system (3) are provided in an interior zone (9a) of a land vehicle (9) and **in that** the product outlets (5) are provided in the body (9b) of the vehicle (9).

15. Installation according to either of claims 12 and 13, **characterized in that** the mixing zone (3a) is a mixing chamber (3d) to which the evacuation outlets (1a, 2a) lead; and **in that** the distributor system (6) includes  
 5 at least one right main duct (6a) which extends along the interior of the vehicle (9) and links the mixing zone (3a) with at least one right product outlet (5a) in a right lateral part (9c) of the external part of the vehicle (9);  
 and at least one left main duct (6b) which extends along the interior of the vehicle (9) and links the mixing zone (3a) with at least one left product outlet (5b) in a left lateral part (9d) of the external part of the vehicle (9).
16. Installation according to claim 13, 14 or 15, **characterized in that** it includes  
 an upper right distribution duct (6c) with at least one upper right product outlet (5c), and a lower right distribution duct (6d) with at least one lower right product outlet (5d); and  
 10 an upper left distribution duct (6e) with at least one upper left product outlet (5e), and a lower left distribution duct (6f) with at least one lower left product outlet (5f).
17. Installation according to claim 15 or 16, **characterized in that** at least one of the upper product outlets (5c,5e) is situated in the upper part of the vehicle (9).  
 20
18. Installation according to claim 15, 16 or 17, **characterized in that** at least one of the lower product outlets (5d,5f) is situated in the lower part of the vehicle (9).  
 25
19. Installation according to any of claims 15 to 18, **characterized in that** it includes at least one front product outlet (5g) linked to one of the ducts (6a,6b,6c,6d, 6e,6f).  
 30
20. Installation according to any of claims 15 to 19, **characterized in that** it includes at least one rear product outlet (5h) linked to one of the ducts (6a,6b,6c,6d, 6e,6f).  
 35
21. Installation according to any of claims 15 to 20, **characterized in that**  
 each duct (6a,6b,6c,6d,6e,6f) is connected to the mixing chamber (3d) via separate throats (3b) which pass through a front wall (3c) of the mixing chamber (3d);  
 40 each throat (3b) is able to be blocked by a blocking pendulum (18) provided in the mixing chamber;  
 the blocking pendulum (18) consists of an upper part (18a), a lower part (18b) heavier than the upper part (18a) and a tilting shaft (18c) between the lower part (18b) and the upper part (18a);  
 45 the lower part (18b) of the blocking pendulum (18) is dimensioned for allowing at least one of said throats (3b) to be free when the vehicle (9) is in the horizontal position, and for blocking at least one of said throats (3b) when the vehicle (9) is in an over-turned position.
22. Installation according to any of claims 13 to 21, **characterized in that** they include impact detector means (19) which transmit the activation signal to the receptor means (4) when they detect that an impact suffered by the vehicle (9) has an intensity greater than the rated impact.  
 50
23. Installation according to claim 22, **characterized in that** it includes timer means (20) which, when the receptor means receive the activation signal from the impact detector means (19), delay the activation of the impeller system (7).  
 55
24. Installation according to claim 2, **characterized in that** it is provided in a construction (27), and **in that** the distributor system (6) includes an array of pipes (6g) via which the evacuation outlets (1a,2a) of the reservoirs (1,2) are connected to the product outlets (5).  
 60
25. Installation according to claim 24, **characterized in that** the reservoirs (1,2) are tanks arranged in a first zone (27a) of the construction (27), and the product outlets (5) are arranged in at least one second zone (27b) of the construction (27).  
 65
26. Installation according to claim 24 or 25, **characterized in that** the first evacuation outlet (1 a) is provided in a lower part of the first tank (1) and the second evacuation outlet (2a) is provided in a lower part of the second tank (2).  
 70
27. Installation according to claim 25 or 26, **characterized in that** the mixing zone (3a) is a mixing chamber (3d) connected to the evacuation outlets (1a,2a) of the reservoirs (1,2) and to the distributor system (6).  
 75
28. Installation according to claim 27, **characterized in that** the mixing system (3) includes a first duct (3e) which connects the first evacuation outlet (1a) of the first reservoir (1) to the mixing chamber (3d) and a second duct (3f) which connects the second evacuation outlet (2a) of the second reservoir (2) to the mixing chamber (3d).  
 80
29. Installation according to claim 27 or 28, **characterized in that** the mixing chamber (3d) is provided in a plane lower than the evacuation outlets (1a,2a) of the reservoirs (1,2).  
 85
30. Installation according to claim 27, 28 or 29, **character-**

- terized in that the impeller system (7) includes at least one electric pump (7e,7f) selected from between a first electric pump (7e) for pumping the first component (A) of the chemoluminescent product (C) from the first evacuation outlet (1a) as far as the mixing chamber (3d) and a second electric pump (7f) for pumping the second component (B) of the chemoluminescent product (C) from the second evacuation outlet (2a) as far as the mixing chamber (3d).
31. Installation according to claim 30, **characterized in that** the electric pumps (7e,7f) have sufficient power for impelling the chemoluminescent product (C) from the mixing chamber (3d) to the product outlets (5).
32. Installation according one of claims 27 to 31, **characterized in that** the mixing system (33) includes an impeller electric pump (7g) connected to the mixing chamber (3d) and to the distributor system (6) for impelling the chemoluminescent product (C) from the mixing chamber (3d) to the product outlets (5).
33. Installation according to one of claims 24 to 32, **characterized in that** the first reservoir (1) and the second reservoir (2) are chambers with a single tank.
34. Installation according to claim 24, 25 or 26, **characterized in that**  
the first evacuation outlet (1 a) of the first reservoir (1) is connected to an inlet opening (2b) of the second reservoir (2);  
the mixing zone (3a) is situated in the second reservoir (2) as a continuation of the inlet opening (2b);  
the second evacuation outlet (2a) is connected to the distributor system (6);  
and **in that** it includes  
decanting means (7h,8h) for decanting the first component (A) of the chemoluminescent product (C) from the first reservoir (1) to the second reservoir (2); and  
generator means (29) for sequential orders for activation connected to the receptor means (4) for sequentially activating the decanting means (7h,30) and the impeller system (7).
35. Installation according to claim 34, **characterized in that** it includes a decanting duct (6h) connected to the first product outlet (1a) and to the inlet opening (2b).
36. Installation according to claim 34 or 35, **characterized in that**  
the first reservoir (1) is provided in a plane higher than the second reservoir (2);  
the first evacuation outlet (1 a) is provided in the lower part of the first reservoir (1); and,  
the decanting means include an electrovalve (8h) which opens in response to an opening order generated by the generator means (29) for sequential orders.
37. Installation according to claims 34, 35 or 36, **characterized in that** the inlet opening (2b) is provided in the upper part of the second reservoir (2).
38. Installation according to claim 35, 36 or 37, **characterized in that** the decanting means include an electric decanting pump (30) that can be actuated in response to an activator order and connected to the decanting duct (6h) for pumping the first component (A) of the chemoluminescent product (C) to the second reservoir (2).
39. Installation according to one of claims 34 to 38, **characterized in that** the mixing system (33) includes an electric impeller pump (7g) connected to the second evacuation outlet (2a) and to the distributor system (6).
40. Installation according to one of claims 24 to 39, **characterized in that** the construction (27) is a building (31).
41. Installation according to one of claims 24 to 39, **characterized in that** the construction (27) is a ship (32).
42. Installation according to any of claims 2 to 41, **characterized in that** the sealing means (8) are selected from between automatic valves (8a) which open in response to an increase in pressure from the fluid in the reservoir (1,2) that they seal, membranes (8b) that break when the pressure of the fluid in the reservoir (1,2) they seal increases, or flaps (8c) that open when the pressure of the fluid in the reservoir (1,2) they seal increases.
43. Installation according to any of the preceding claims, **characterized in that** at least one of the product outlets (5,5a,5b,5c,5d,5e,5f,5g,5h) is provided with a spray nozzle (16).
44. Installation according to any one of claims 13 - 23, **characterized in that** at least one of the product outlets (5,5a,5b,5c,5d,5e,5f,5g,5h) is provided with a spray nozzle (16) oriented in such a way that it projects the chemoluminescent product (C) onto at least one external part of the vehicle (9).
45. Installation according to any one of the preceding claims, **characterized in that** at least one of the product outlets (5,5a,5b,5c,5d,5e,5f,5g,5h) is connected to a product tank (17) that is at least translucent for the chemoluminescent product (C).
46. Installation according to claim 45, **characterized in that** the product tank (17) is included in the trim of

an automobile vehicle (9).

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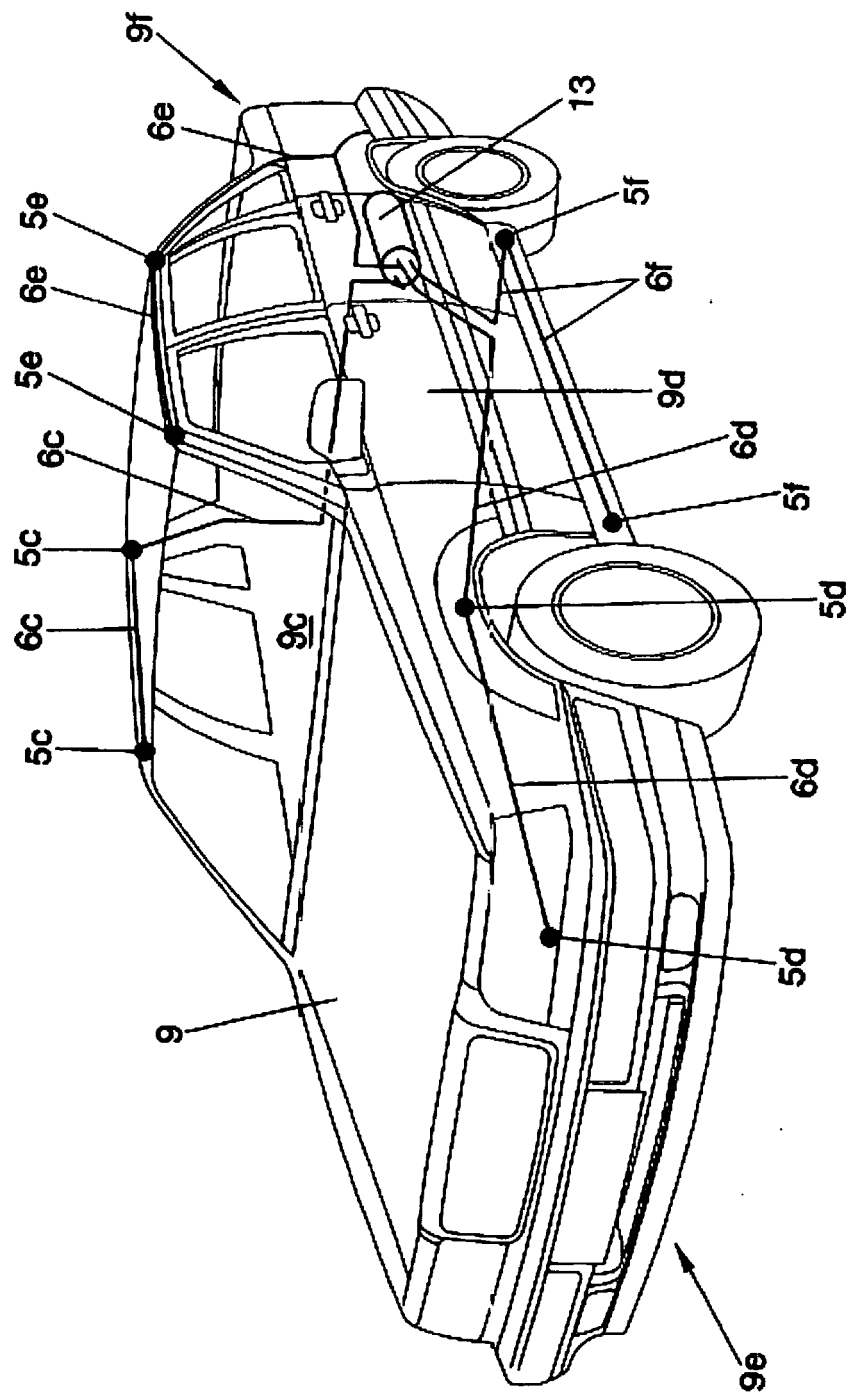
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**FIG. 1**

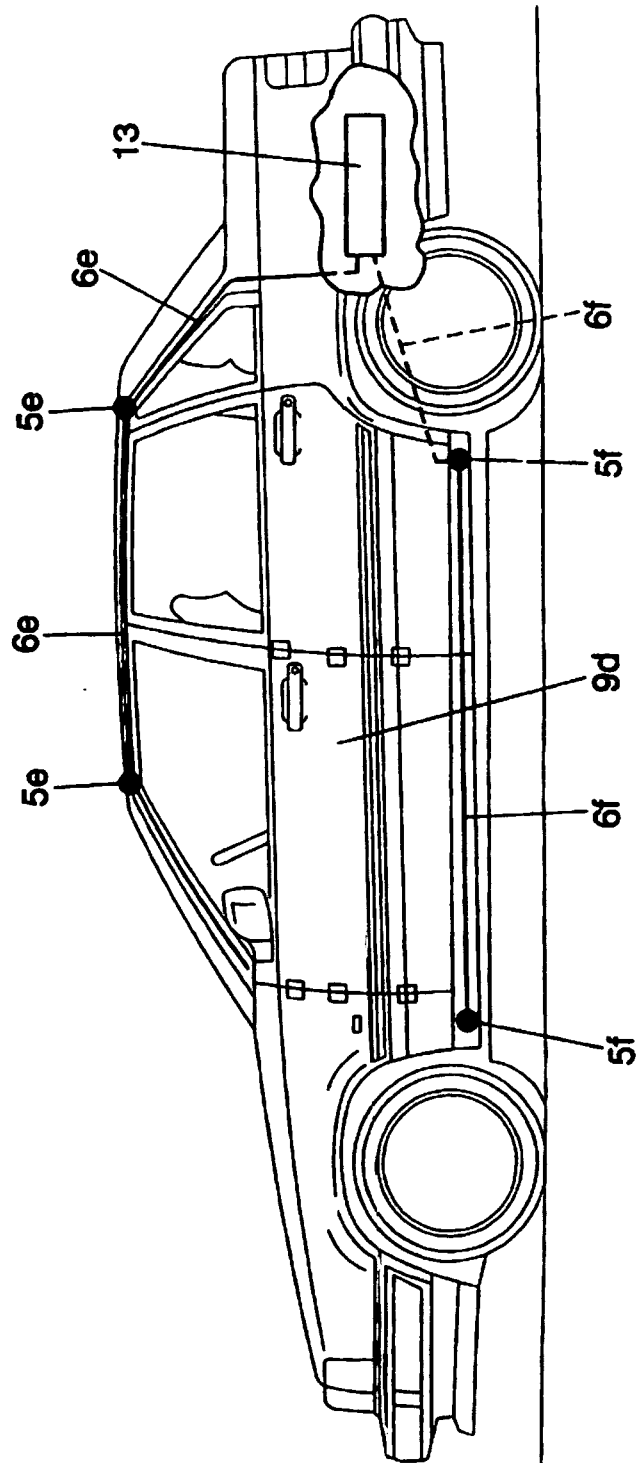


FIG. 2

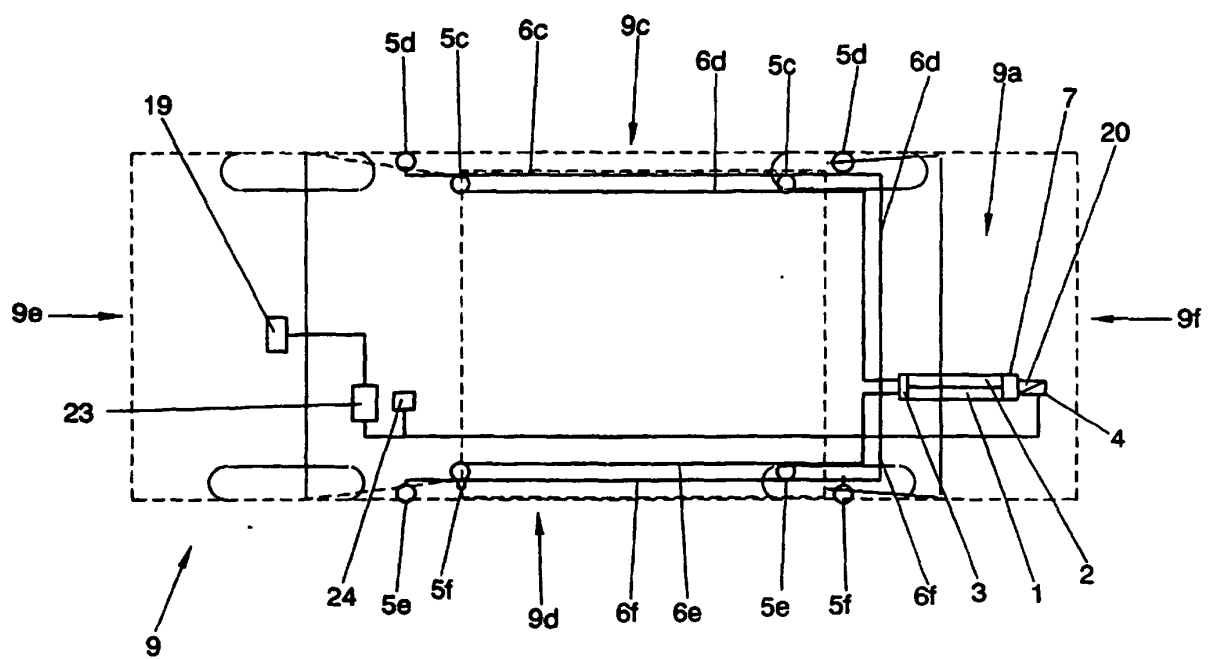


FIG. 3

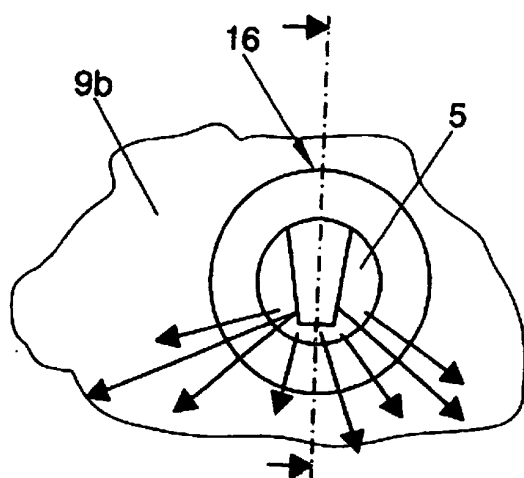


FIG. 4A

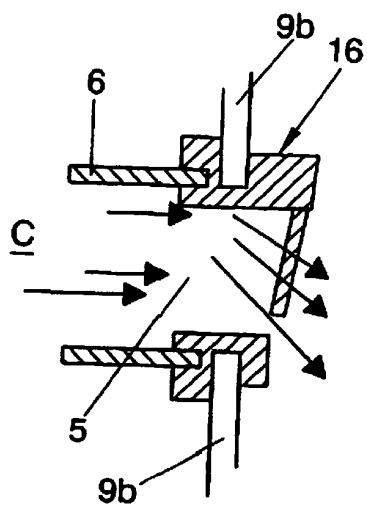


FIG. 4B

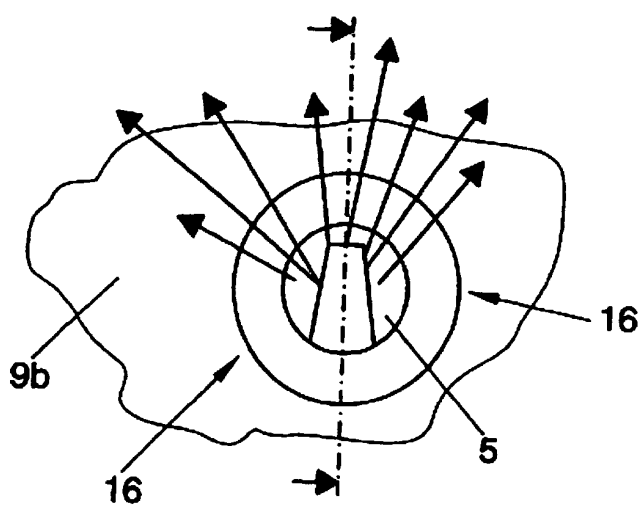


FIG. 4C

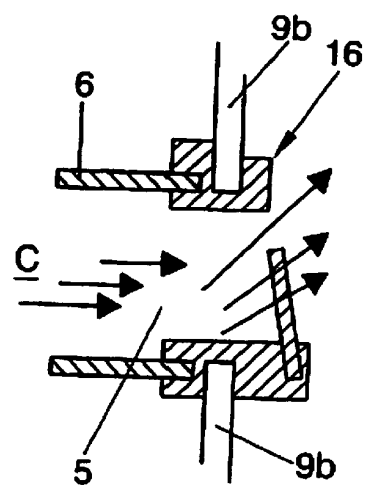


FIG. 4D

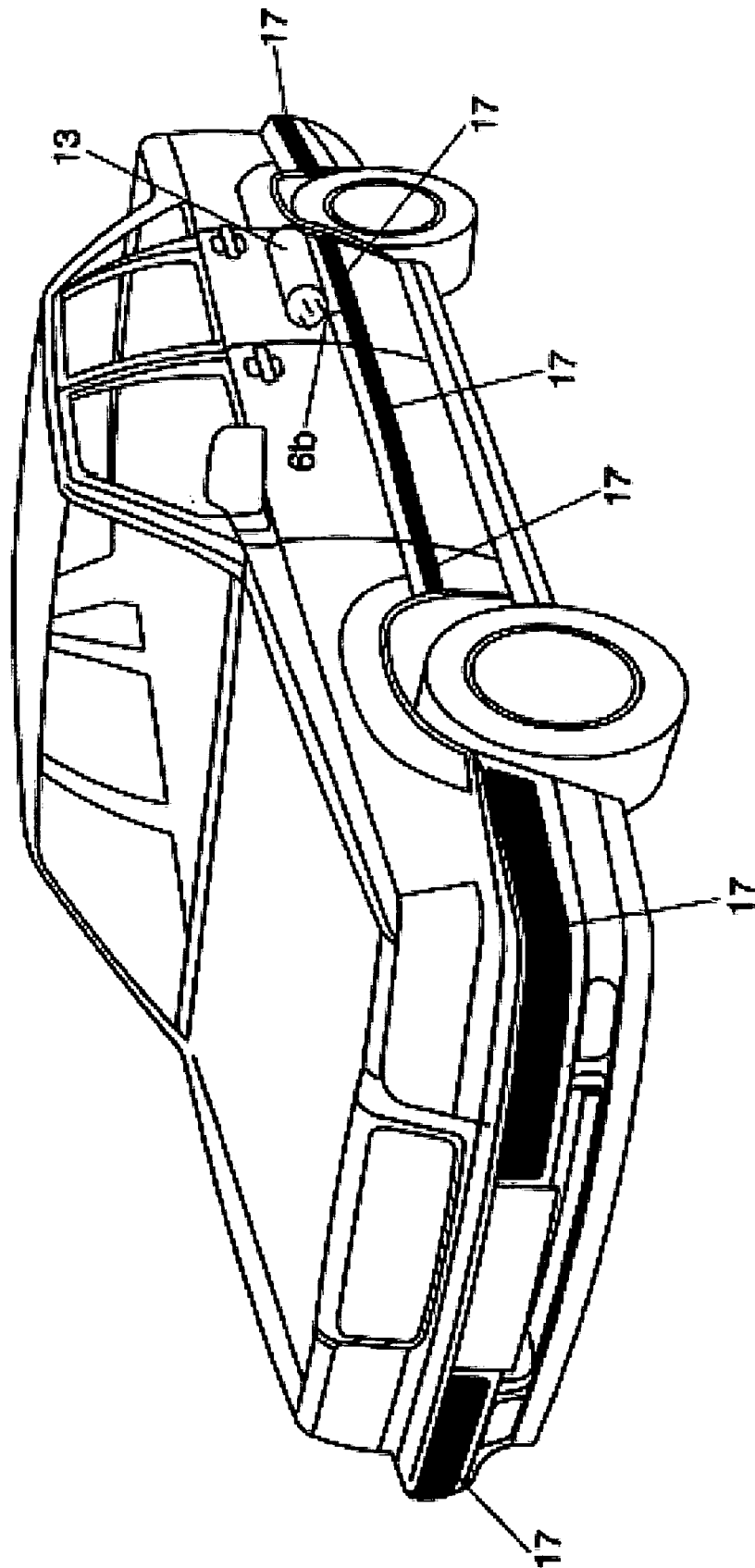


FIG. 5

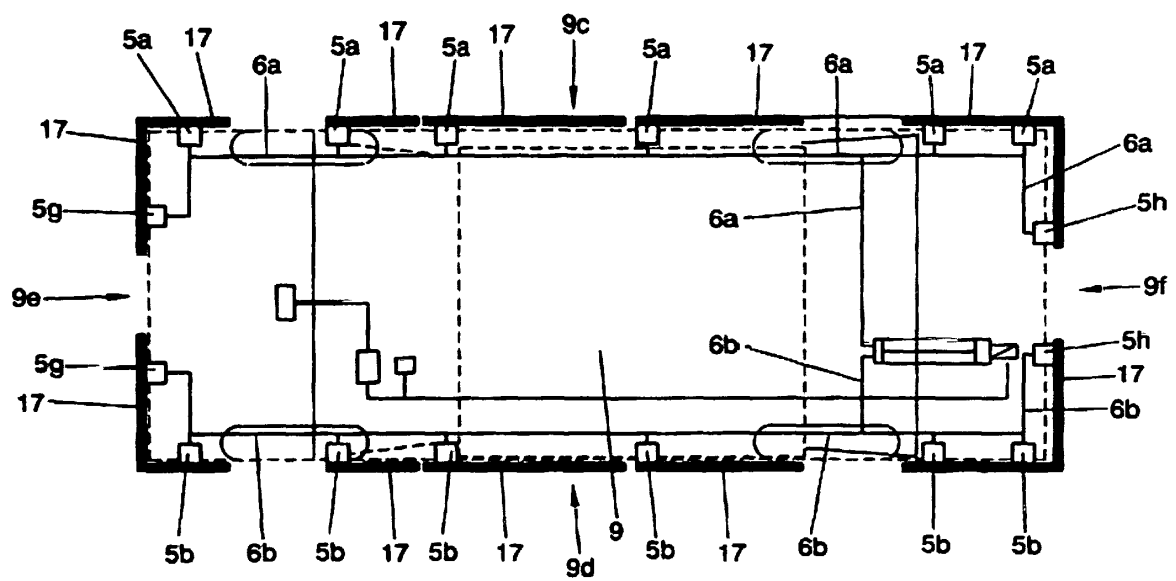


FIG. 6

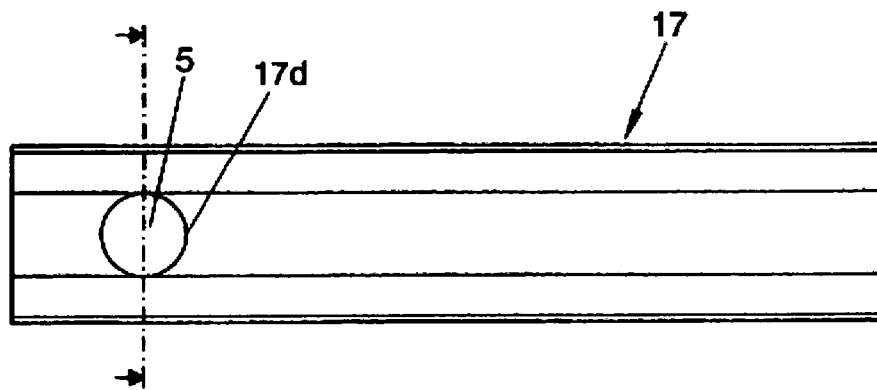


FIG. 7

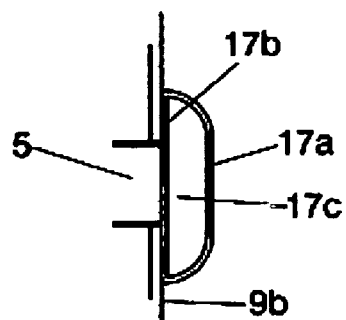


FIG. 8

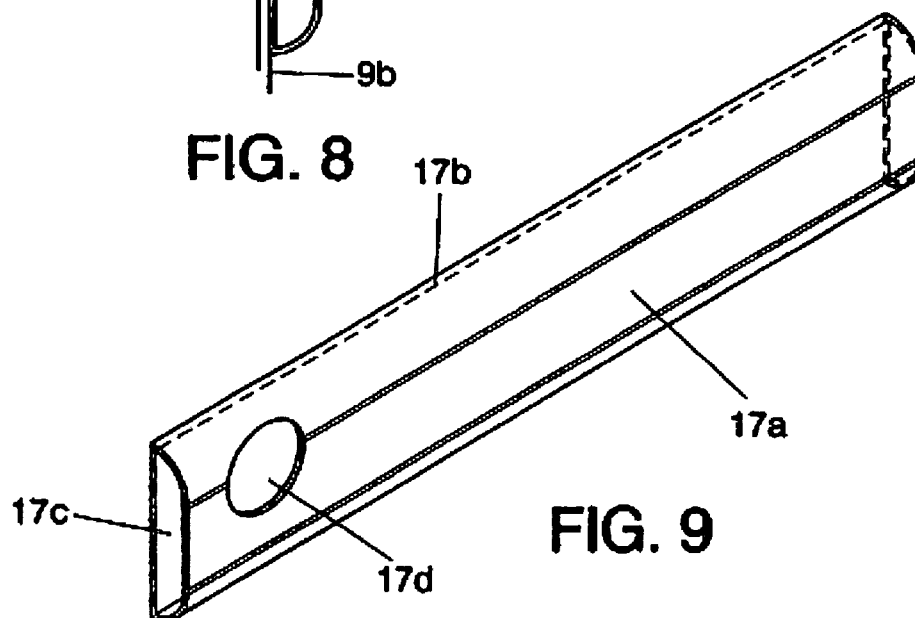


FIG. 9

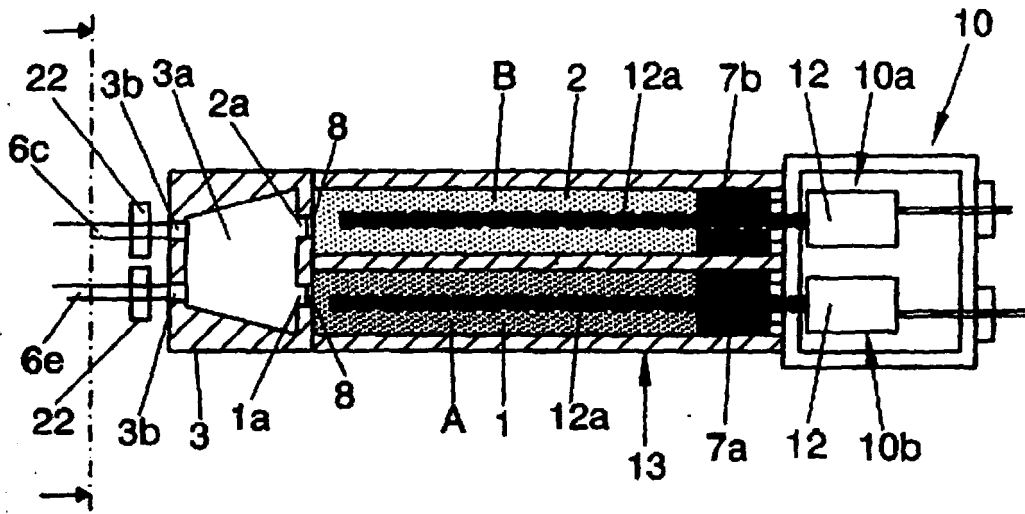


FIG. 10

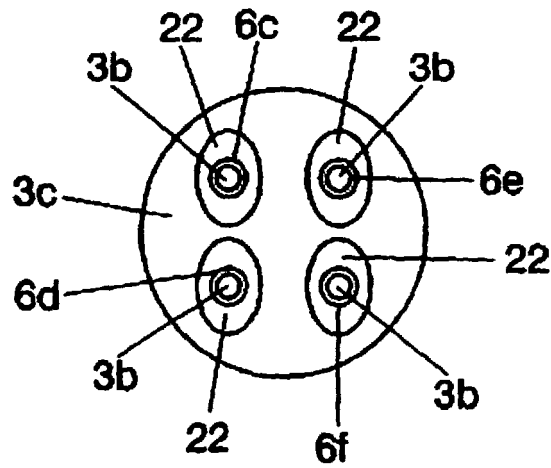


FIG. 11



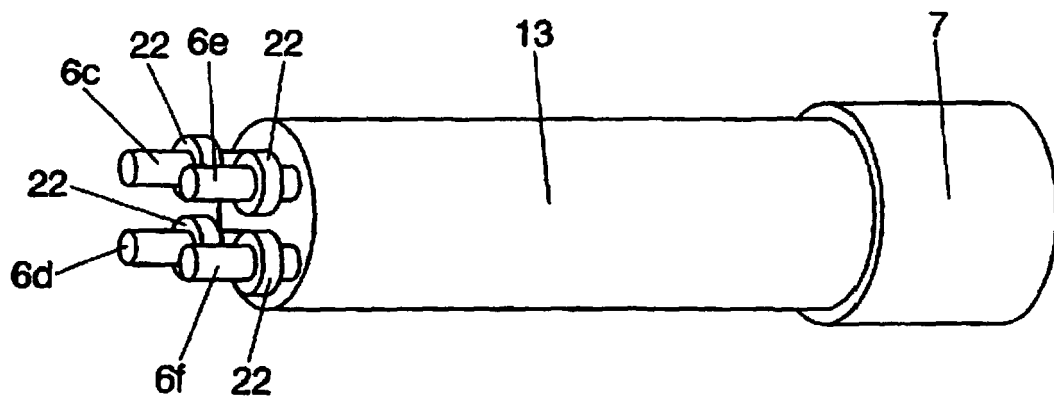


FIG. 12

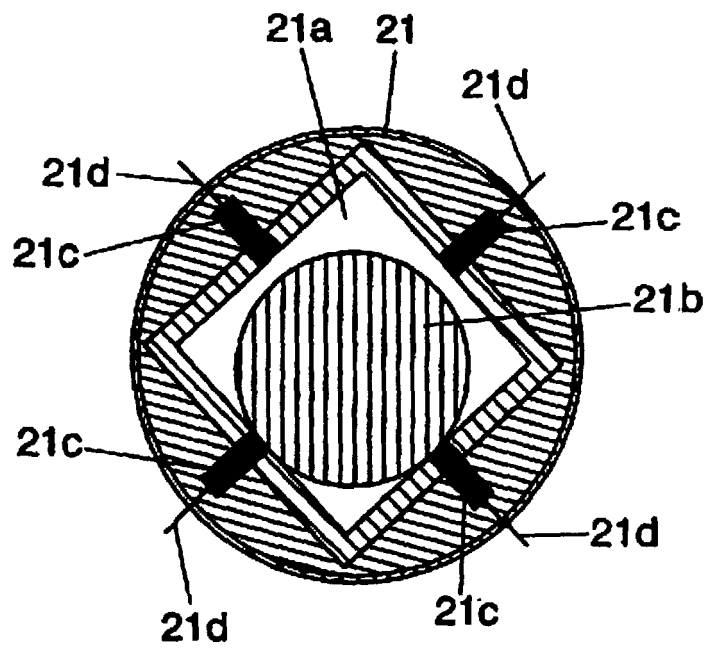


FIG. 13

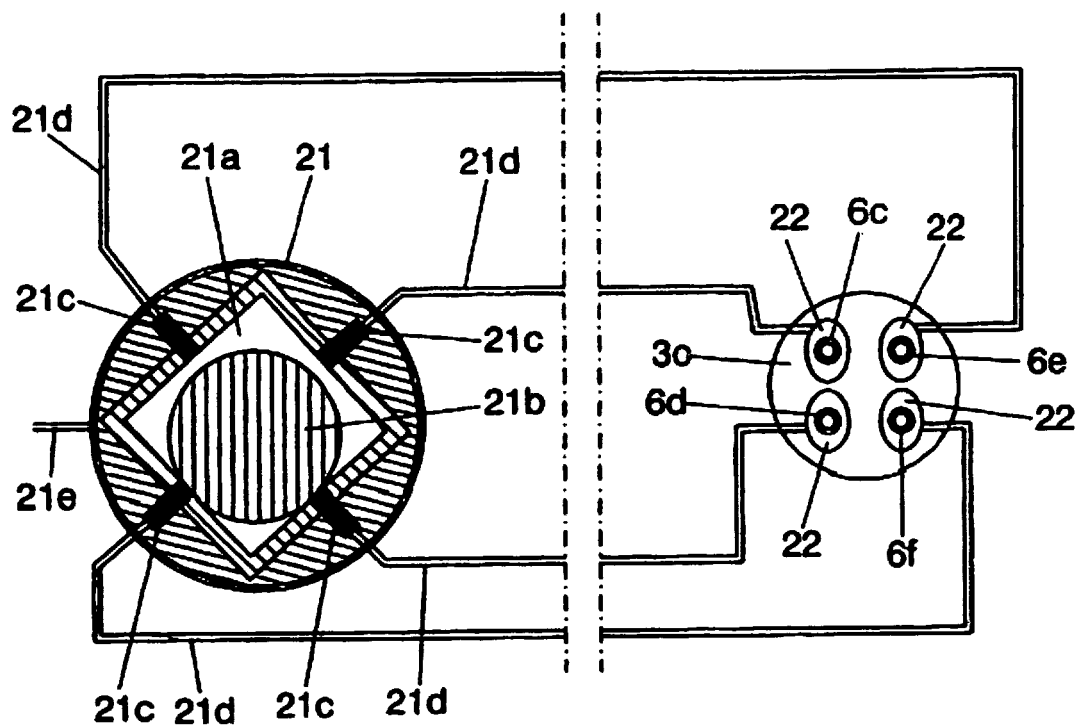


FIG. 14

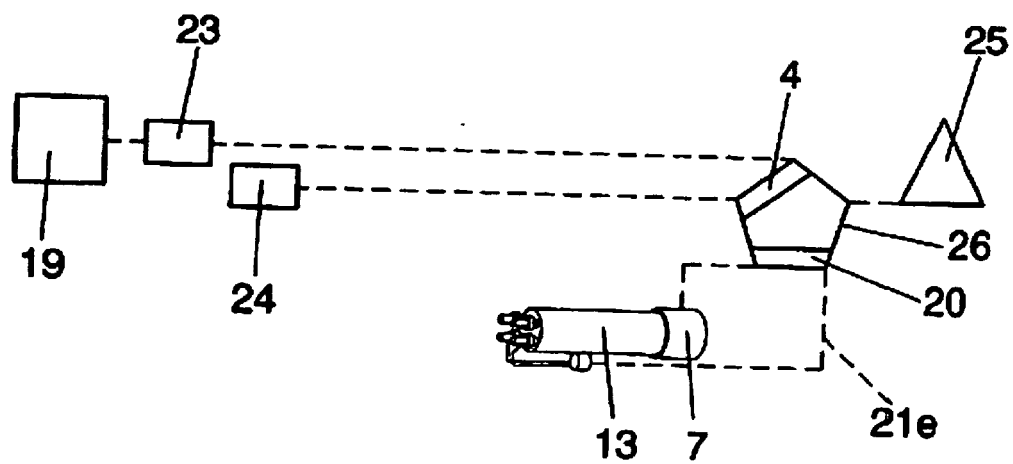


FIG. 15

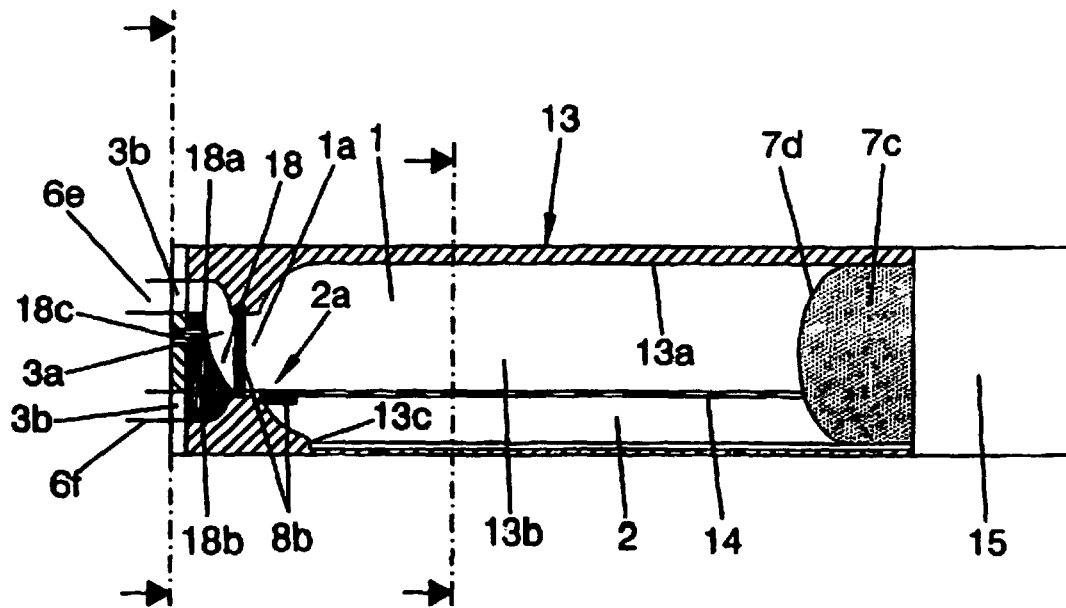


FIG. 16

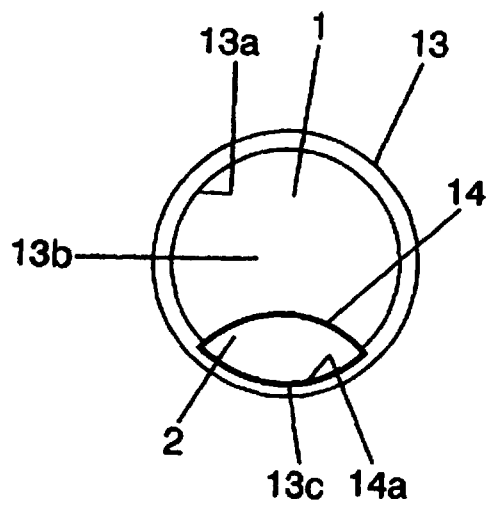


FIG. 17

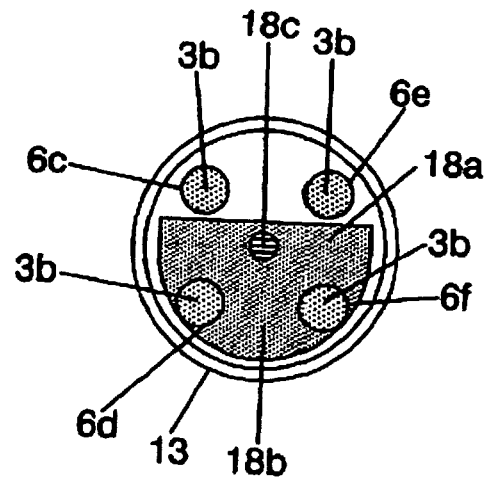


FIG. 18

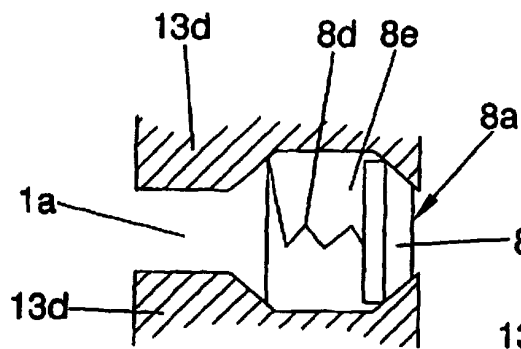


FIG. 19A

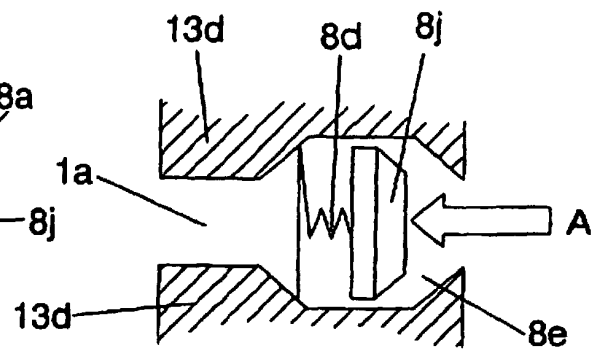


FIG. 19A

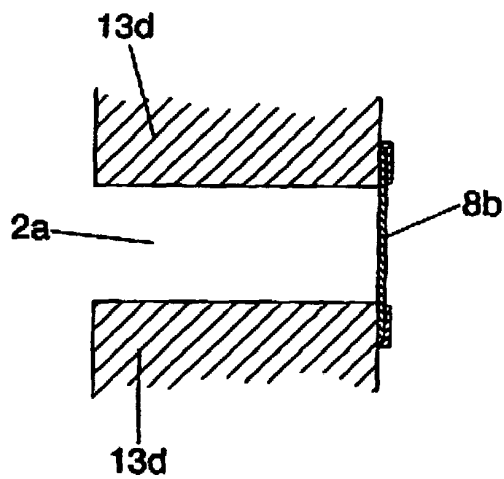


FIG. 20A

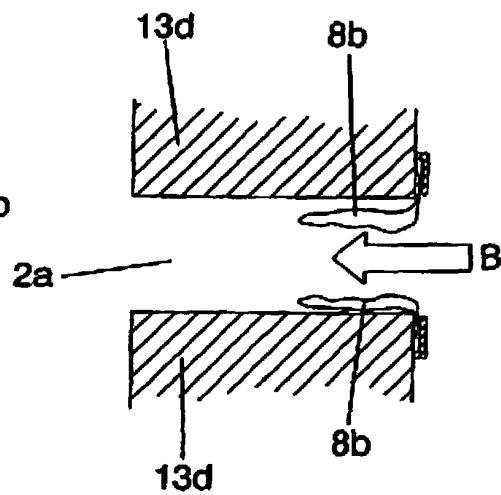


FIG. 20B

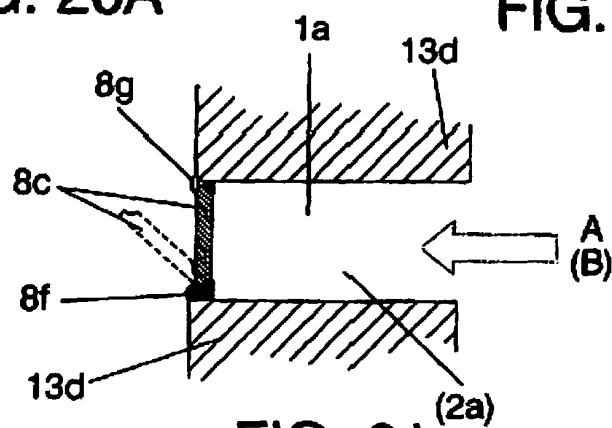
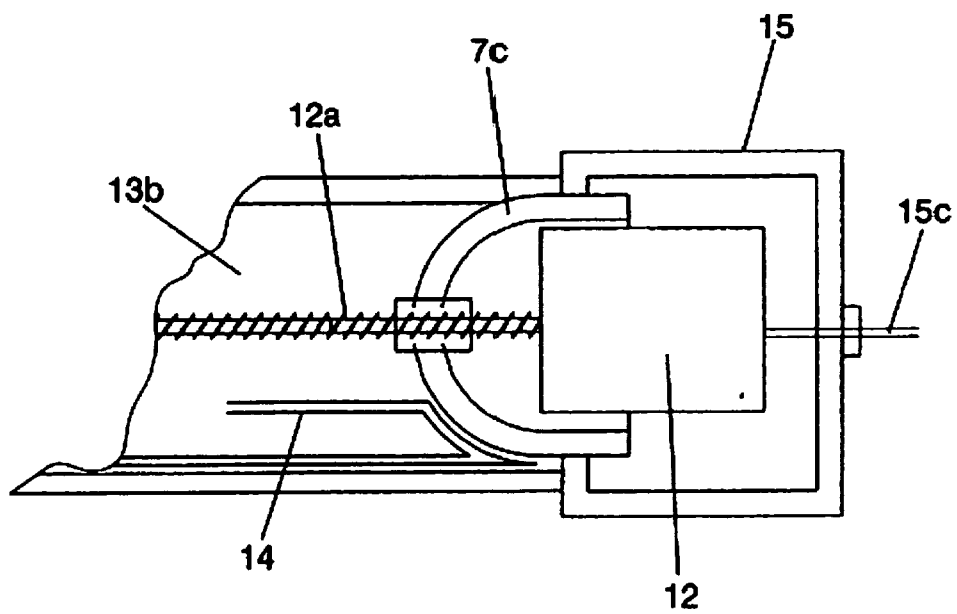
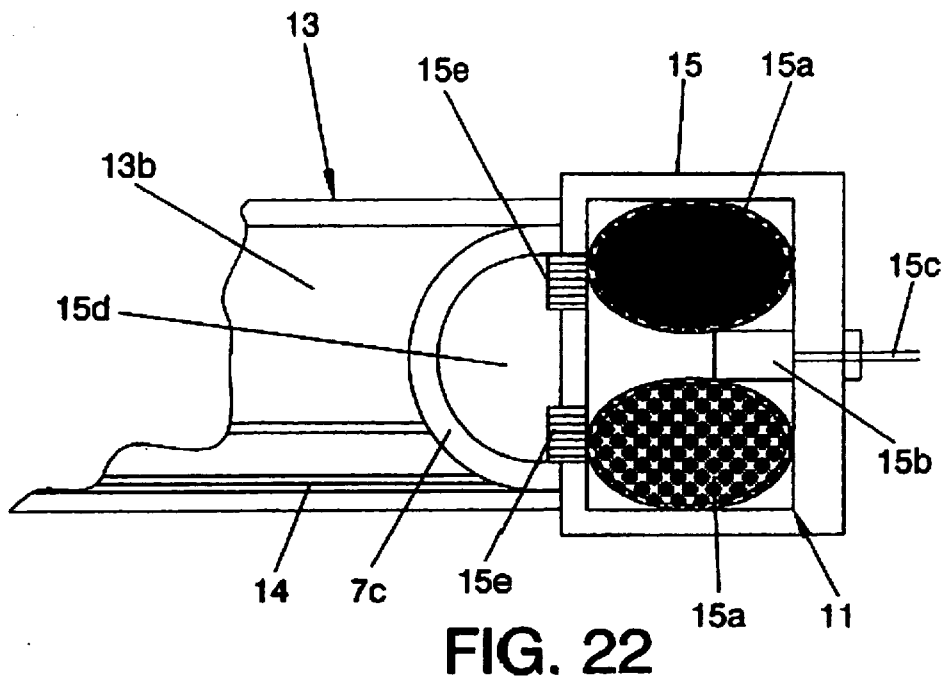


FIG. 21



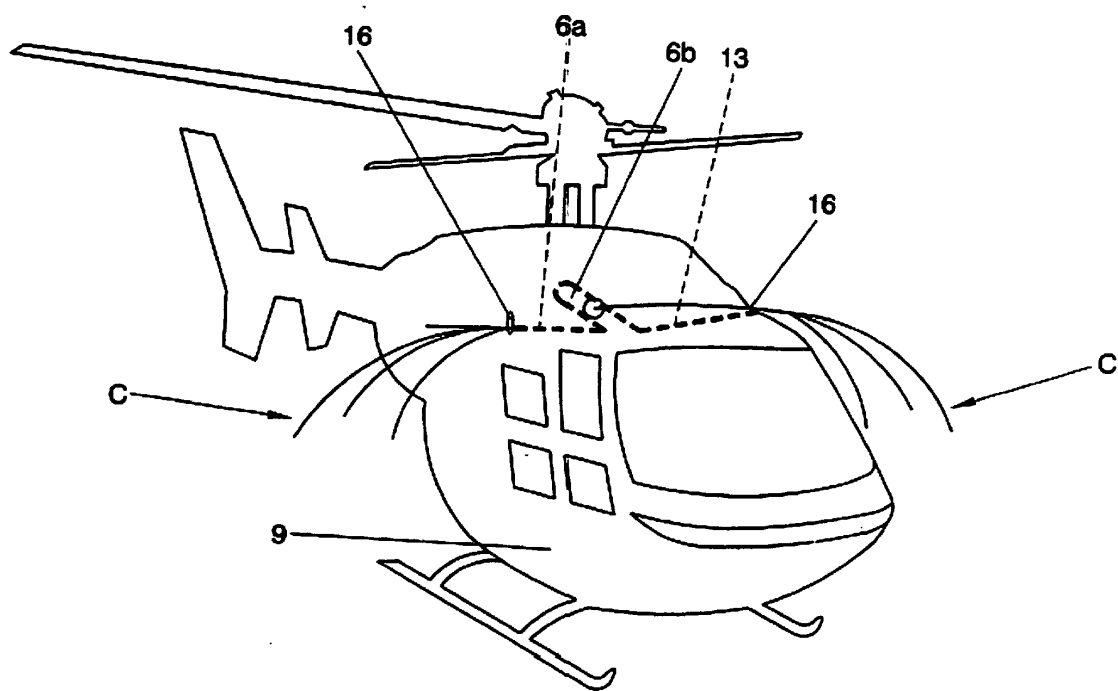
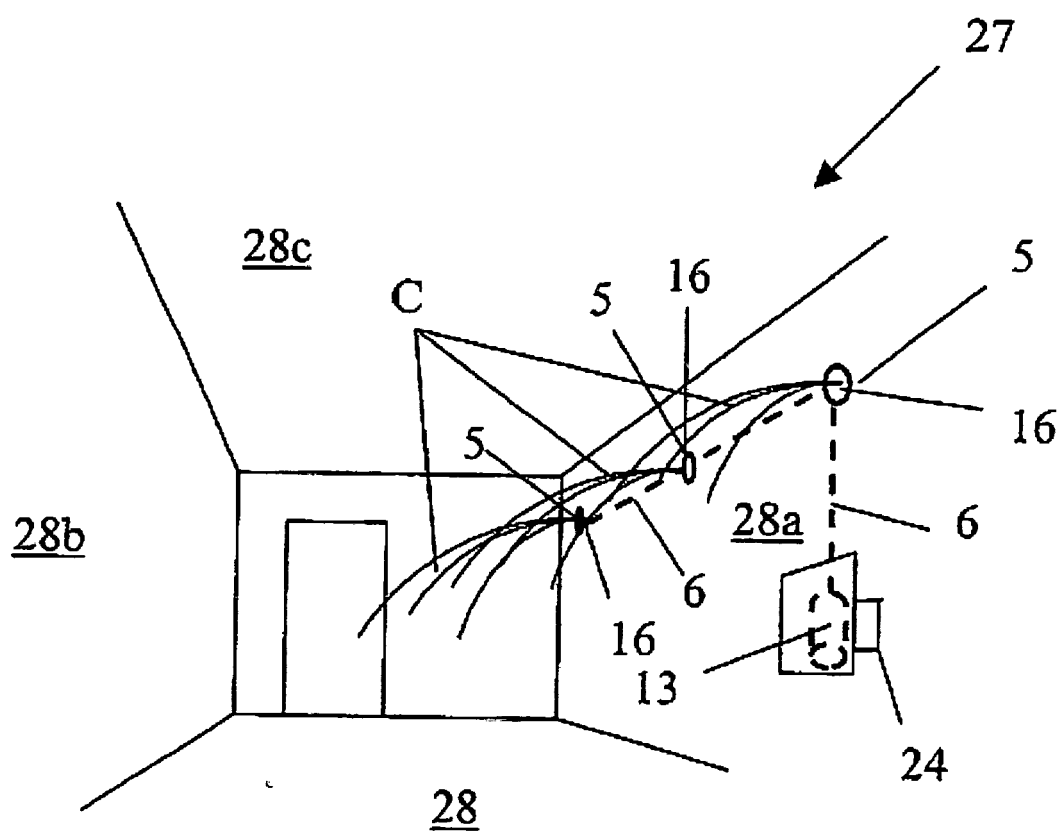
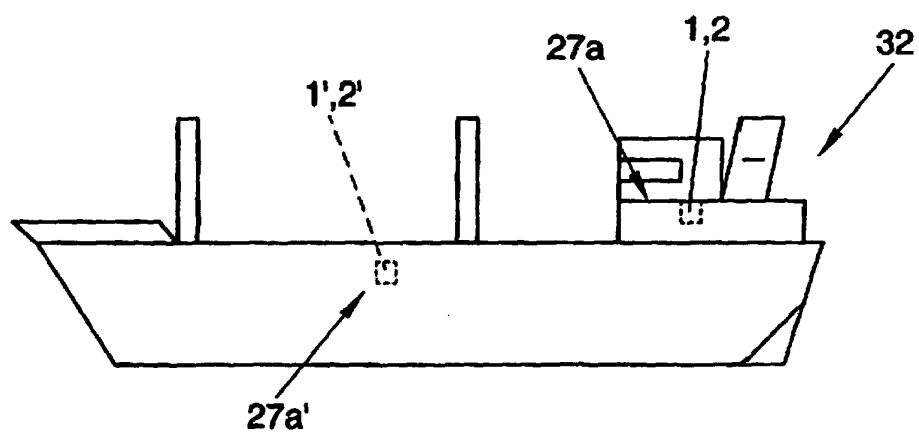
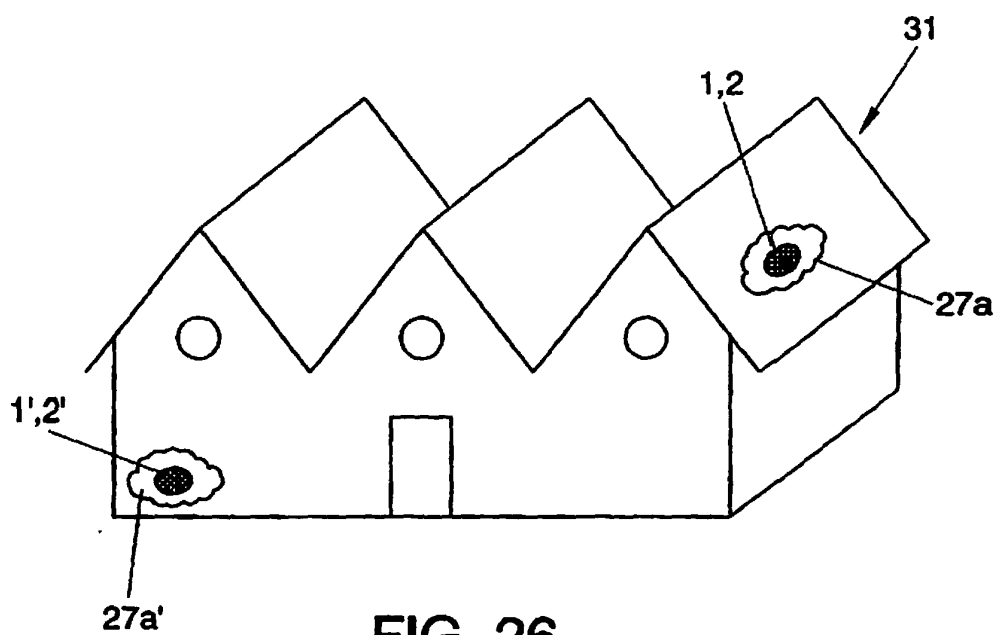


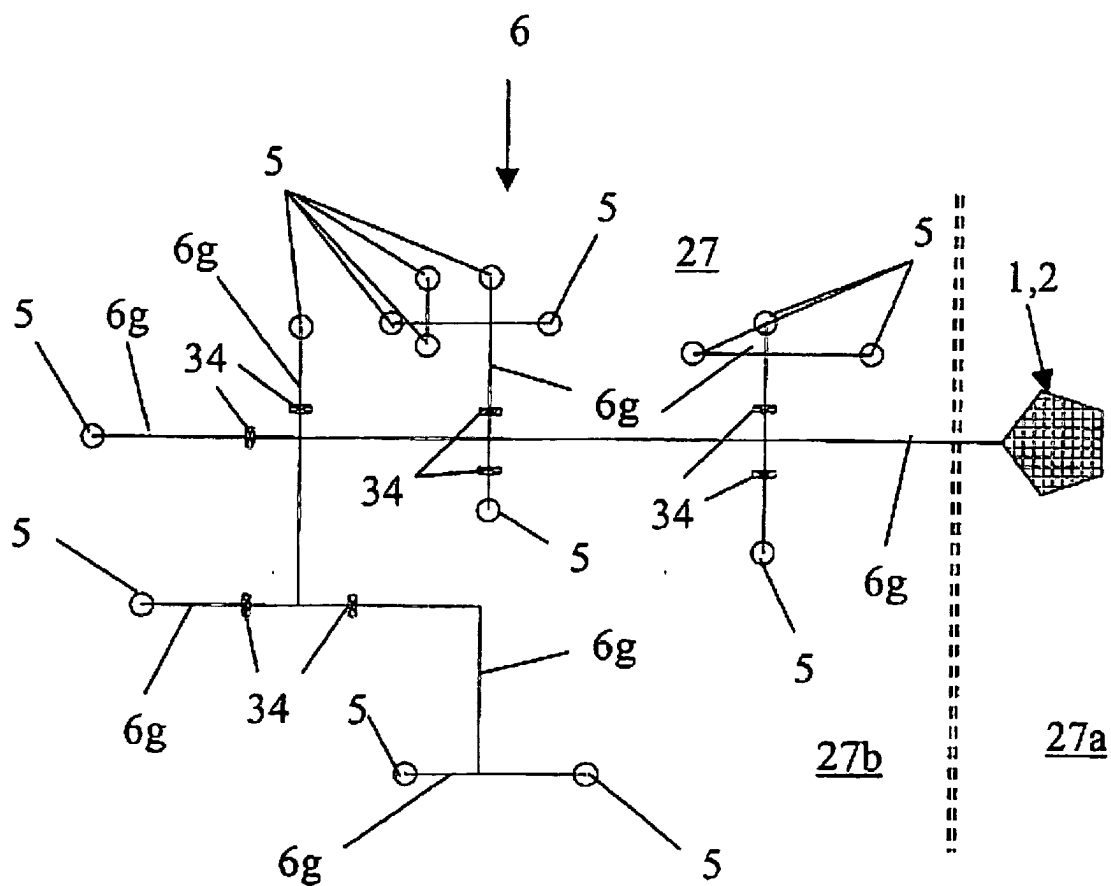
FIG. 24



**Fig. 25**







**Fig. 28**

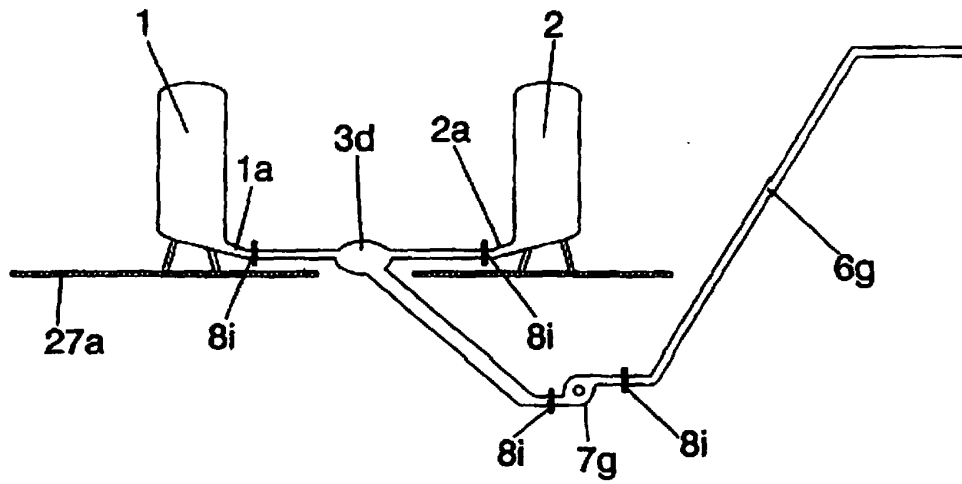


FIG. 29

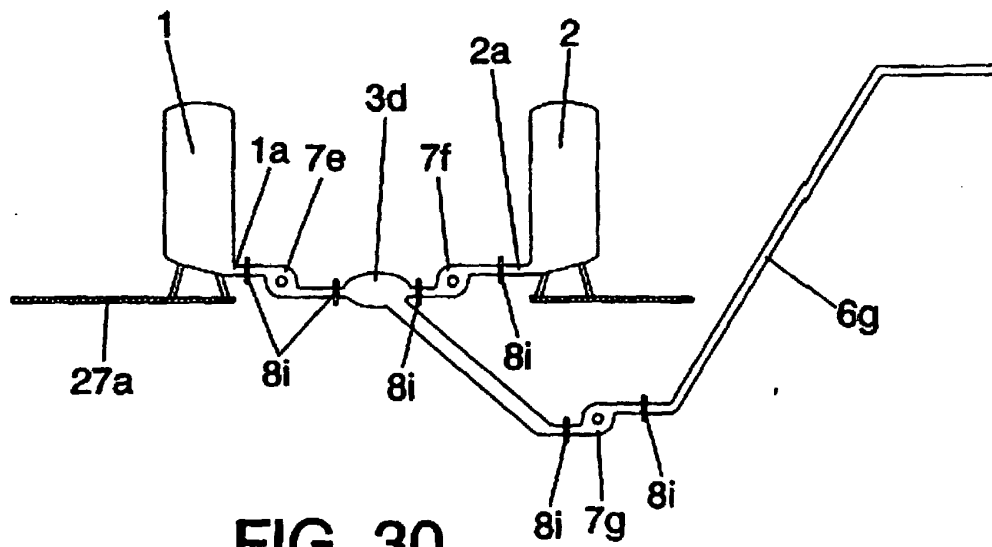


FIG. 30

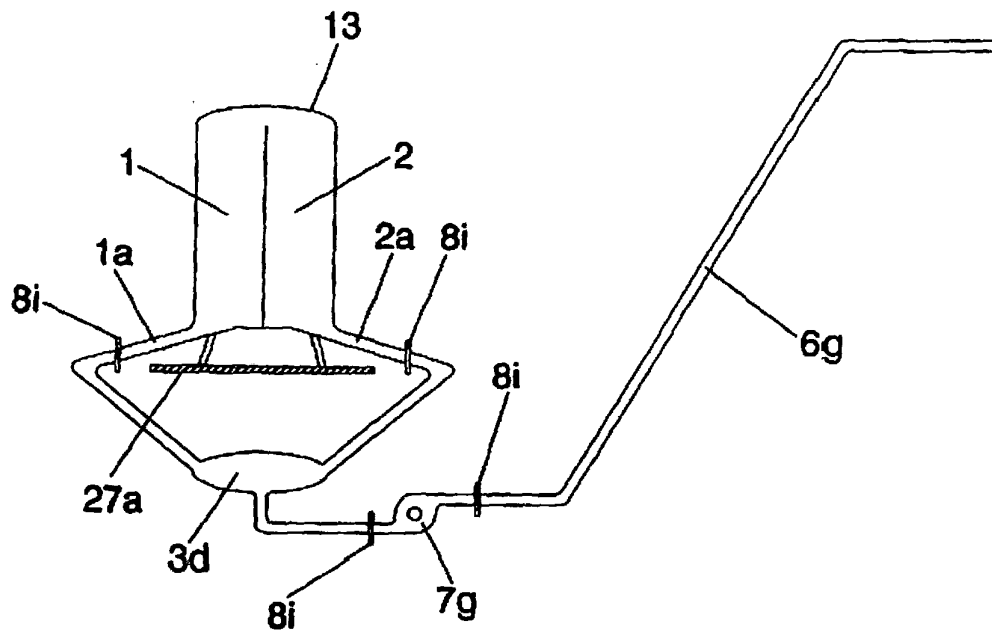


FIG. 31

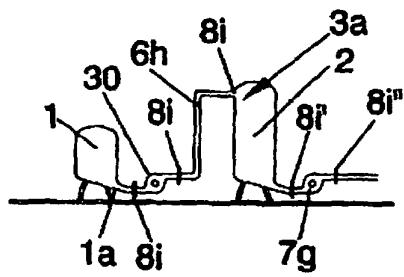


FIG. 32

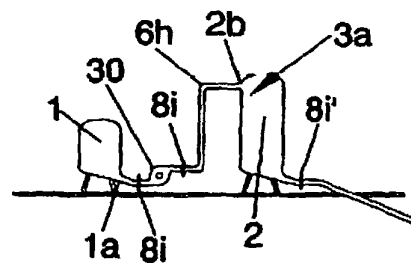


FIG. 33

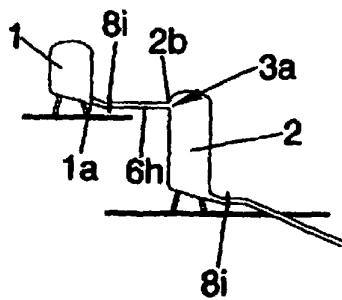


FIG. 34

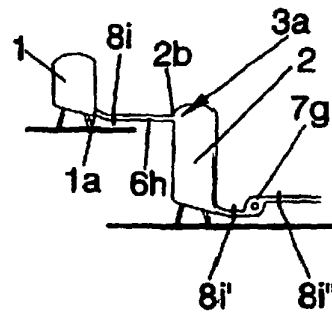
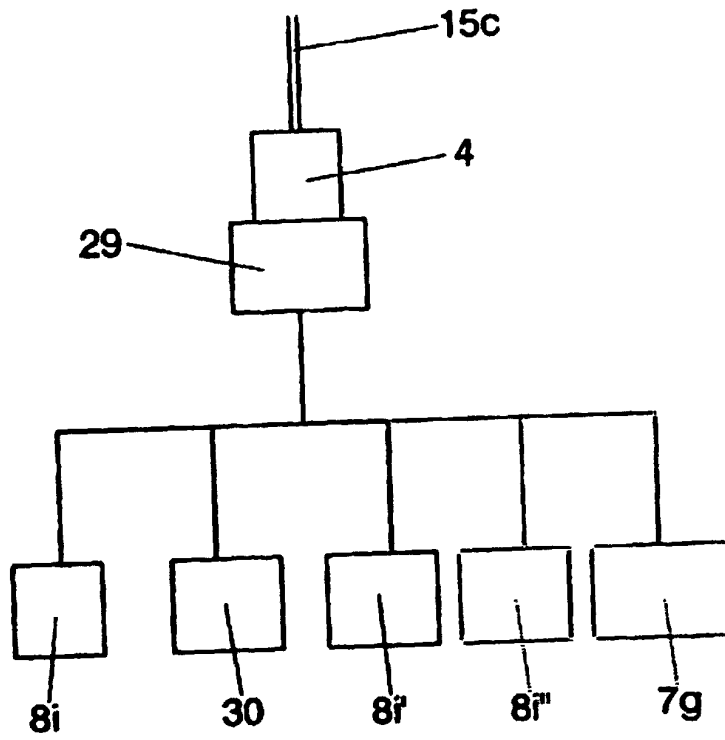
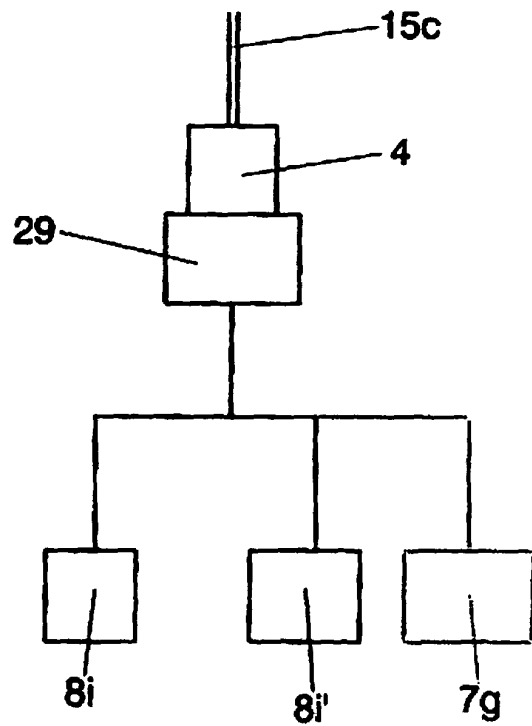


FIG. 35



**FIG. 36**



**FIG. 37**

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2007/000130

## A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F21K, B60Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

OEPMPT, EPODOC, WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	WO 9838455 A1 (STRATUS SYSTEMS, INC.) 03.09.1998,	
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A	DE 10248787 A1 (VOLKSWAGEN AG) 29.04.2004,	
A	FR 2723896 A1 (BRIERE, J.) 01.03.1996,	
A	US 4959756 A (DODSON, J. W.) 25.09.1990,	
A	US 5406463 A (SCHEXNAIDER SR., L. M.) 11.04.1995,	

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.		
"E" earlier document but published on or after the international filing date		
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"P" document published prior to the international filing date but later than the priority date claimed		
	"&"	document member of the same patent family

Date of the actual completion of the international search

30.June.2007 (30.06.2007)

Date of mailing of the international search report

(06/08/2007)

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# EP 2 034 232 A1

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ES 2007/000130

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2007/000130

CLASSIFICATION OF SUBJECT MATTER

*F21K 2/06* (2006.01)

*B60Q 1/52* (2006.01)

**REFERENCES CITED IN THE DESCRIPTION**

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